UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Metlakatla Seaplane Facility Refurbishment Project
Metlakatla, Alaska

NMFS Consultation Number: AKRO-2020-03066

Action Agencies: **Federal Aviation Administration**
NMFS Office of Protected Resources

Affected Species and Determinations:

ESA-Listed Species	Status	Is the Action Likely to Adversely Affect Species?	Is the Action Likely to Adversely Affect Critical Habitat?	Is the Action Likely To Jeopardize the Species?	Is the Action Likely To Destroy or Adversely Modify Critical Habitat?
Humpback Whale, Mexico DPS (*Megaptera novaeangliae*)	Threatened	Yes	N/A	No	N/A

Consultation Conducted By: National Marine Fisheries Service, Alaska Region

Issued By:

for James W. Balsiger, Ph.D.
Regional Administrator

Date: July 23, 2021

https://doi.org/10.25923/qcvc-s044

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TERMS AND ABBREVIATIONS

µPa	Micro Pascal
ADOT&PF	Alaska Department of Transportation and Public Facilities
AKR	Alaska Region
BA	Biological Assessment
CI	Confidence Interval
CNP	Central North Pacific
CSEL	Cumulative Sound Exposure Level
DTH	Down the Hole
DPS	Distinct Population Segment
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FR	Federal Register
ft	Feet
IPCC	Intergovernmental Panel on Climate Change
ITS	Incidental Take Statement
km	Kilometers
kn	Knots
L	Liter
m	Meter
mi	Mile
MMPA	Marine Mammal Protection Act
NMFS	National Marine Fisheries Service
Opinion	Biological Opinion
Pa	Pascals
PTS	Permanent Threshold Shift
RMS	Root Mean Square
s	Second
SEL	Sound Exposure Level
SPL	Sound Pressure Level
SSV	Sound Source Verification
TTS	Temporary Threshold Shift

1. Introduction

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. § 1536(a)(2)) requires each Federal agency to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a Federal agency's action "may affect" a protected species, that agency is required to consult with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS), depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR § 402.14(a)). Federal agencies may fulfill this general requirement informally if they conclude that an action may affect, but "is not likely to adversely affect" endangered species, threatened species, or designated critical habitat, and NMFS or the USFWS concurs with that conclusion (50 CFR § 402.14(b)).

Section 7(b)(3) of the ESA requires that at the conclusion of consultation, NMFS and/or USFWS provide an opinion stating how the Federal agency's action is likely to affect ESA-listed species and their critical habitat. If incidental take is reasonably certain to occur, section 7(b)(4) requires the consulting agency to provide an incidental take statement (ITS) that specifies the impact of any incidental taking, specifies those reasonable and prudent measures necessary or appropriate to minimize such impact, and sets forth terms and conditions to implement those measures.

In this document, the action agencies are the Federal Aviation Administration (FAA) and the NMFS Office of Protected Resources, Permits and Conservation Division (PR1). The Alaska Department of Transportation and Public Facilities (ADOT&PF) has been designated as the non-federal representative for FAA. FAA, in cooperation with the ADOT&PF, is proposing maintenance improvements to the existing Metlakatla Seaplane Facility. PR1 proposes to authorize Marine Mammal Protection Act (MMPA) Level B take (i.e., take by harassment) of one ESA-listed marine mammal species: humpback whale (*Megaptera novaeangliae*), and seven non-listed marine mammal species: Steller sea lion (*Eumetopias jubatus*), harbor seal (*Phoca vitulina*), harbor porpoise (*Phocoena phocoena*), Dall's porpoise (*Phocoenoides dalli*), killer whale (*Orcinus orca*), Pacific white-sided doplohin (*Lagenorhynchus obliquidens*), and minke whael (*Balaenoptera acutorostrata*) in conjunction with the action. No level A take has been proposed for humpback whales.

This project includes the removal of 11 existing steel piles (16-inch diameter) and installation of six (24 inch diameter) permanent steel piles to support replacement of the floating dock structure. Twelve (24 inch diameter) temporary steel piles will be installed to support pile installation and will be removed following the completion of pile installation. In addition, above-water construction will include repairs to the vehicle gangway and installation of an electrical lighting system for the approach and the new floating dock..

The consulting agency for this proposal is NMFS's Alaska Region (AKR). This document represents NMFS's biological opinion (opinion) on the effects of this proposal on endangered and threatened species and designated critical habitat.

The opinion and ITS were prepared by NMFS Alaska Region in accordance with section 7(b) of the ESA (16 U.S.C. § 1536(b)), and implementing regulations at 50 CFR part 402.

The opinion and ITS are in compliance with the Data Quality Act (44 U.S.C. § 3504(d)(1)) and underwent pre-dissemination review.

1.1 Background

This opinion is based on information provided by HDR in the August 7, 2020, Biological Assesment(HDR 2020b); the June 1, 2020 Technical Memorandum(HDR 2020c); the January 25, 2021 Memo from ADOT&PF to PR1 and AKR; the application for IHA authorization(HDR 2020a); and the proposed IHA (86 FR 34203). Other sources of information include email and telephone conversation between NMFS AKR, FAA, ADOT&PF, HDR, and PR1 staff. A complete record of this consultation is on file at NMFS's Juneau, Alaska office.

This Opinion considers the effects of maintenance improvements to the existing Metlaktla Seaplane Facility in Metakatla, Alaska (see Figures 1 & 2). These actions may affect the Mexico distinct population segment (DPS) of humpback whales.

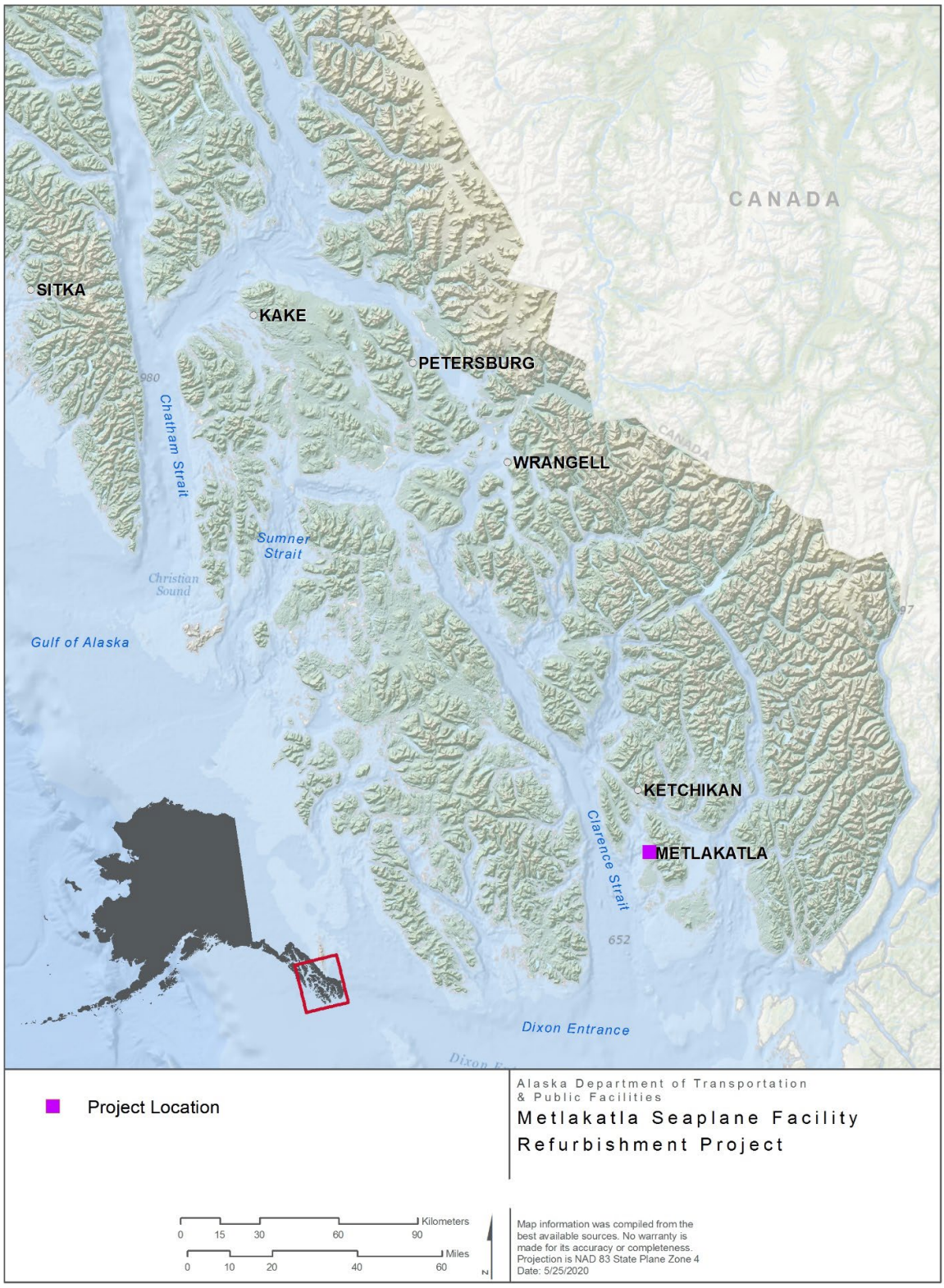

Figure 1. Project Location, Metlakatla, Alaska(HDR 2020b).

Figure 2. Project location in Port Chester, Metlakatla, AK(HDR 2020b)

1.2 Consultation History

On June 10, 2021, NMFS AKR received from FAA a biological assessment for the Metlakatla Seaplane Facility Refurbishment Project, along with a request to initiate formal consultation and a statement designating ADOT&PF as the non-federal representative. On June 30, 2021, PR1 submitted a request to initiate formal Section 7 consultation to NMFS AKR. On July 1, 2021, NMFS AKR initiated formal consultation.

- **June 23, 2020**: Agency coordination meeting and ADOT&PF provided a technical memo on the project
- **July 10, 2020**: NMFS notified ADOT&PF that the DTH drilling source levels for the project were under evaluation.
- **August 10, 2020**: ADOT&PF provided a Biological Assessment prepared by HDR, INC for the Metlakatla Seaplane Facility Refurbishment Project (state project #: SFAPT00270) and a request to initiate formal consultation, but held it in abeyance pending revisions to the IHA application and receipt of a request to initiate consultation from PR1.
- **August 10, 2020**: ADOT&PF submitted a draft IHA application prepared by HDR, INC to NMFS PR1.
- **October 26, 2020**: PR1 requested clarification on the species included, Level A harassment language and mitigation, monitoring and reporting sections of the IHA application.
- **November 13, 2020**: Early Review Team meeting (internal to NMFS)
- **November 23, 2020**: PR1 deemed the IHA application adequate and complete.
- **December 7, 2020**: ADOT&PF submitted a revised Biological Assessment and IHA application to AKR and PR1.
- **January 13, 2021**: ADOT&PF notified NMFS AKR and PR1 about a revised project description increasing the template piles from four to eight 24 inch tempary steel piles.
- **January 25, 2021**: ADOT&PF submitted a memo to NMFS AKR and PR1 outlining the addition of eight 24-inch temporary piles to the proposed action
- **Feburary 23, 2021**: ADOT&PF submmited a revised memo to NMFS AKR and PR1 that included updated tables outlining the additional temporary pilings, shutdown zones, and estimated number of exposures to Level B harrassment
- **May 17, 2021**: NMFS AKR requested details on the roles, responsibilities, and relationship between ADOT&PF and FAA specific to the Metlakatla Seaplane Facility project
- **June 1, 2021**: NMFS AKR informed FAA and ADOT&PF that after discussions with NOAA General Counsel, it was determined that FAA was the federal agency responsible for the ESA consultation
- **June 10, 2021**: FAA submitted a request to initiate formal consultation, and designated

ADOT as the non-federal representative

- **June 28, 2021** : PR1 filed the proposed IHA, which was published in the Federal Register on June 29, 2021.
- **June 30, 2021**: PR1 submitted a request to initiate formal Section 7 consultation to NMFS AKR.
- **July 1, 2021**: NMFS AKR deemed the initiation package complete and initiated consultation with PR1 and FAA.

2. Description of the Proposed Action and Action Area

2.1 Proposed Action

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. 50 C.F.R. § 402.02.

This opinion considers the effects of the construction activities by ADOT&PF as part of the proposed maintenance improvements to the existing Metlakatla Seaplane Facility. The proposed project is located at Latitude 55° 7'50.30" N., Longitude 131° 34' 28.08" W. The Metlakatla Seaplane Facility is centrally located in the village of Metlakatla on the south shore of Port Chester. The project site is located in the community of Metlakatla, on Annette Island, in the Prince of Wales-Hyder Census Area of Southeast Alaska. Metlakatla is located about 24 kilometers (15 miles) south of Ketchikan, in Southeast Alaska.

The action is expected to occur over approximately 2 months beginning in Fall 2021. Pile installation will occur intermittently during the work period, for durations of minutes to hours at a time. Pile installation and removal will occur over 26 non-consecutive days within the 2-month construction window.

2.1.1 Proposed Activities

The project includes the removal of 11 existing steel piles and removal of the multiple-float timber structure which covers 8,600 square feet. A new 4,800 square foot, single float timber structure will be installed and will include installation of 6 permanent steel piles to support replacement of the floating dock structure (Table 1). Four piles will be installed vertically (plumb), and 2 will be installed at an angle (battered). Twelve temporary (template) steel piles will be installed to support pile installation and will be removed following the completion of pile installation. Pile driving will utilize vibratory and impact hammers to install and remove piles and conduct DTH pile installation to position rock sockets and tension anchors.

Pile removal will be conducted using a vibratory hammer. Pile installation will be conducted using both a vibratory and impact hammer and DTH pile installation methods. Piles will be advanced to refusal using a vibratory hammer. After DTH pile installation, the final approximately 10 feet of driving will be conducted using an impact hammer so that the structural capacity of the pile embedment can be verified.

The pile installation methods used will depend on sediment depth and conditions at each pile location. Pile installation and removal will occur in waters approximately 6 to 7 meters (20 to 23 feet) in depth. Rock socketing is a process where a pile is driven by conventional vibratory and impact hammers until reaching solid bedrock. In addition, above-water construction will include repairs to the vehicle gangway and installation of an electrical lighting system for the approach and the new floating dock.

Table 1. Types and Numbers of Piles to be Installed and Removed during the Metlakatla Seaplane Facility Refurbishment Project.

Pile Diameter and Type	Number of Piles	Rock Sockets	Tension Anchors	Impact Strikes per pile (duration in minutes)	Vibratory Duration per Pile (minutes)	DTH Pile Installation (Rock Socket) Duration per Pile (Minutes)	DTH Pile Installation (Tension Anchor) Duration per pile (minutes)	Total Duration of Activity per Pile (hours)	Production Rate Piles per Day (Range)	Days of Installation or Removal
Pile Installation										
24” Steel Plumb Piles (Permanent)	4	4	4	20 (15)	15	180	120	5.5	0.5 (0-1)	8
24” Steel Batter Piles (Permanent)	2	2	2	20 (15)	15	90	120	4	0.5 (0.1)	4
24” Steel Piles (Temporary)	12	12	0	20 (15)	15	60	N/A	1.5	2 (1-3)	6
Pile Removal										
16” Steel Piles	11	N/A	N/A	N/A	30	N/A	N/A	0.5	3 (2-4)	4
24” Steel Piles (Temporary)	12	N/A	N/A	N/A	30	N/A	N/A	0.5	3 (2-4)	4
Totals	29	18	6	N/A	N/A	N/A	N/A	N/A	N/A	26

DTH: down-the-hole; N/A: not applicable

2.1.2 Mitigation Measures

ADOT&PF has agreed that ADOT&PF or its Contractor will implement the following measures to avoid and minimize impacts to the Mexico DPS humpback whale.

Unless otherwise specified, the term "pile driving activities" is defined to include vibratory pile removal, vibratory pile driving, impact pile driving, and/or down-the-hole socketing and anchoring.

General Conditions

1. ADOT&PF will not conduct pile installation work between April 1 and June 15 to minimize potential impacts on Pacific salmon species and other important humpback whale prey fish during sensitive periods in the life cycles of the fish.
2. If contaminated or hazardous materials are spilled or released during construction, all work in the vicinity of the contaminated site will be stopped until the Alaska Department of Environmental Conservation (ADEC) is contacted, and a corrective action plan is approved by ADEC and implemented.
3. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, and similar equipment will be checked regularly for drips or leaks, and will be maintained and stored properly to prevent spills.
4. The Contractor will provide and maintain a spill cleanup kit on-site at all times, to be implemented as part of the Spill Prevention, Control, and Countermeasure (SPCC) Plan, as well as the Hazardous Material Control Plan (HMCP) and Work Quality Control Plan (WQCP), in the event of a spill or if any oil products are observed in the water.
5. For in-water heavy machinery and construction work not directly involving pile removal or installation (e.g., barge movements and pile positioning), a 10-meter shutdown zone will be implemented for humpback whales. If a humpback whale comes within 10 meters of these activities, the activity will cease as quickly as can be accomplished safely, and vessels will reduce speed to the minimum level required to maintain steerage and safe working conditions. The activity may resume after the humpback whale is observed leaving the shutdown zone or has not been observed for 15 minutes.
6. Work in waters of the U.S. will be conducted in accordance with the terms and conditions of the U.S. Army Corps of Engineers (USACE) permits to be obtained for the Project.
7. Vessels used in the construction of the Project will follow established transit routes and will travel at slow speeds (< 10 knots) while in the action area.

General Conditions Specific to Pile Driving

8. Before impact pile installation begins, the Contractor will employ a soft start or ramp-up procedure to minimize impacts. The Contractor will provide an initial set of three strikes from the impact hammer at reduced energy, followed by a 30-second waiting period, and then two subsequent three-strike sets. This soft start will be applied prior to the beginning of impact pile installation each day, or after an impact hammer has been idle for more

than 30 minutes. No soft-start or ramp-up procedures are possible during vibratory pile installation.

9. Pile installation/removal will occur only during daylight hours, when visual monitoring of humpback whales can be conducted.

Monitoring and Shutdown Protocol

10. Trained protected species observers (PSOs) will monitor the portion of the action area that is marine waters (i.e., the monitoring zones) for humpback whales.
11. PSOs will maintain verbal contact (via mobile phones or hand-held radios) with construction personnel to immediately call for a halt of pile installation or removal to avoid exposures, if necessary. A clear authorization and communication system will be in place to ensure that PSOs and construction crew members understand their respective roles and responsibilities.
12. PSOs will begin observations 30 minutes prior to the start of pile installation/removal each day.
13. PSOs will have no other construction-related tasks or responsibilities while monitoring for marine mammals. Each PSO will be trained and provided with reference materials to ensure standardized and accurate data collection. Additional details on monitoring are provided in the marine mammal monitoring plan included as an attachment to the IHA application.

Protected Species Observer Requirements

14. PSOs must be independent (i.e., not construction personnel) and have no other assigned tasks during monitoring periods.
15. The action agency or its designated non-federal representative will provide resumes of PSO candidates to the NMFS consultation biologist or section 7 coordinator for approval at least one week prior to in-water work. NMFS will provide a brief explanation of lack of approval in instances where an individual is not approved.
16. At least one PSO will have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization. Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training.
17. At least one PSO will complete PSO training prior to deployment. The training will include:
    - field identification of marine mammals and marine mammal behavior;
    - ecological information on Alaska's marine mammals and specifics on the ecology and management concerns of those marine mammals;
    - ESA and MMPA regulations;
    - mitigation measures outlined in this letter;

- proper equipment use;
- methodologies in marine mammal observation and data recording and proper reporting protocols; and
- an overview of PSO roles and responsibilities.

18. Where a team of three or more PSOs are required, a lead observer or monitoring coordinator must be designated.
19. PSOs will:
    - have vision correctable to 20-20;
    - have the ability to effectively communicate orally, by radio and in person, with project personnel;
    - have prior experience collecting field observations and recording field data accurately and in accordance with project protocols;
    - be able to identify to species all marine mammals that are endemic to the action area;
    - be able to record marine mammal behavior; and
    - have technical writing skills sufficient to create understandable reports of observations
20. PSOs will work in shifts lasting no longer than 4 hours with at least a 1-hour break from monitoring duties between shifts. PSOs will not perform PSO duties for more than 12 hours in a 24-hour period.
21. PSOs will have the ability to effectively communicate orally, by radio and in person, with project personnel to provide real-time information on listed species.
22. PSOs will have the ability and authority to order appropriate mitigation response, including shutdowns, to avoid takes of all listed species.
23. The PSOs will have the following equipment to address their duties:
    - tools which enable them to accurately determine the position of a marine mammal in relationship to the shutdown zone;
    - two-way radio communication, or equivalent, with onsite project manager;
    - tide tables for the project area;
    - watch or chronometer;
    - binoculars (7x50 or higher magnification) with built-in rangefinder or reticles (rangefinder may be provided separately);
    - global positioning system;
    - a legible copy of this LOC and all appendices
    - legible and fillable observation record form allowing for required PSO data entry.

24. Prior to commencing in-water work or at changes in watch, PSOs will establish a point of contact with the construction crew. The PSO will brief the point of contact as to the shutdown procedures if listed species are observed likely to enter or within the shutdown zone, and will request that the point of contact instruct the crew to notify the PSO when a marine mammal is observed. If the point of contact goes "off shift" and delegates his duties, the PSO must be informed and brief the new point of contact.

No level A take will be authorized for humpback whales and shutdown zones will be implemented to prevent injury of humpback whales (Table 2).

Table 2. Shutdown Zones during Pile Installation and Removal

Activity	Pile Diameter	Pile Type and Number of Piles per Day	Shutdown Distance (meters)
Vibratory Installation or Removal	16- and 24-inch	Battered and Plumb	50
DTH (Rock Socket)	24-inch	Temporary	200
		Batttered, Permanent	260
		Plumb, Permanent	415
DTH (Tension Anchor)	8-inch	Permanent	100
Impact	24-inch	3 piles	135
		2-piles	
		1-piles	100

DTH: down-the hole

2.2 Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). For this reason, the action area is typically larger than the project area and extends out to a point where no measurable effects from the proposed action occur.

Metlakatla is located about 24 kilometers (15 miles) south of Ketchikan, in Southeast Alaska. The Metlakatla Seaplane Facility is centrally located in the village of Metlakatla on the south shore of Port Chester.

The action area includes the area in which pile driving and other in-water work activities will take place, the ensonified area around pile driving activities, and other in-water work activities associated with the project (Table 3 and Figure 3). NMFS used acoustic monitoring data from other locations to develop the source levels used to calculate distances to the Level A and Level B thresholds for different sizes of piles and installation/removal methods. The values used and the source from which they were derived are discussed in more detail in Section 6.2.1. The action area also includes transit areas for mobilization and demobilization of construction equipment. Mobilization and demobilization is anticipated to occur in Southeast Alaska, with some materials shipped in from either Anchorage or Washington state. However, considering that a contractor has not been selected at this point in time, staging areas and specific transit routes for operations may vary. ADOT&PF has agreed that all vessels associated with the

project will avoid designated critical habitat and follow established transit routes.

Table 3. Distance (meters) to Pile Driving Isopleths

Activity	Received Level at 10 meters (m)	Level B Harassment Zone (m)
Vibratory Pile Driving/Removal and DTH		
16-in steel piles	161 SPL	5,415 (calculated 5,412)
24-in steel piles	161 SPL	5,415 (calculated 5,412)
8-in and 24-in DTH	166 SPL	11,660
Impact Pile Driving		
24-in steel piles	181 SEL/ 193 SPL	1,585

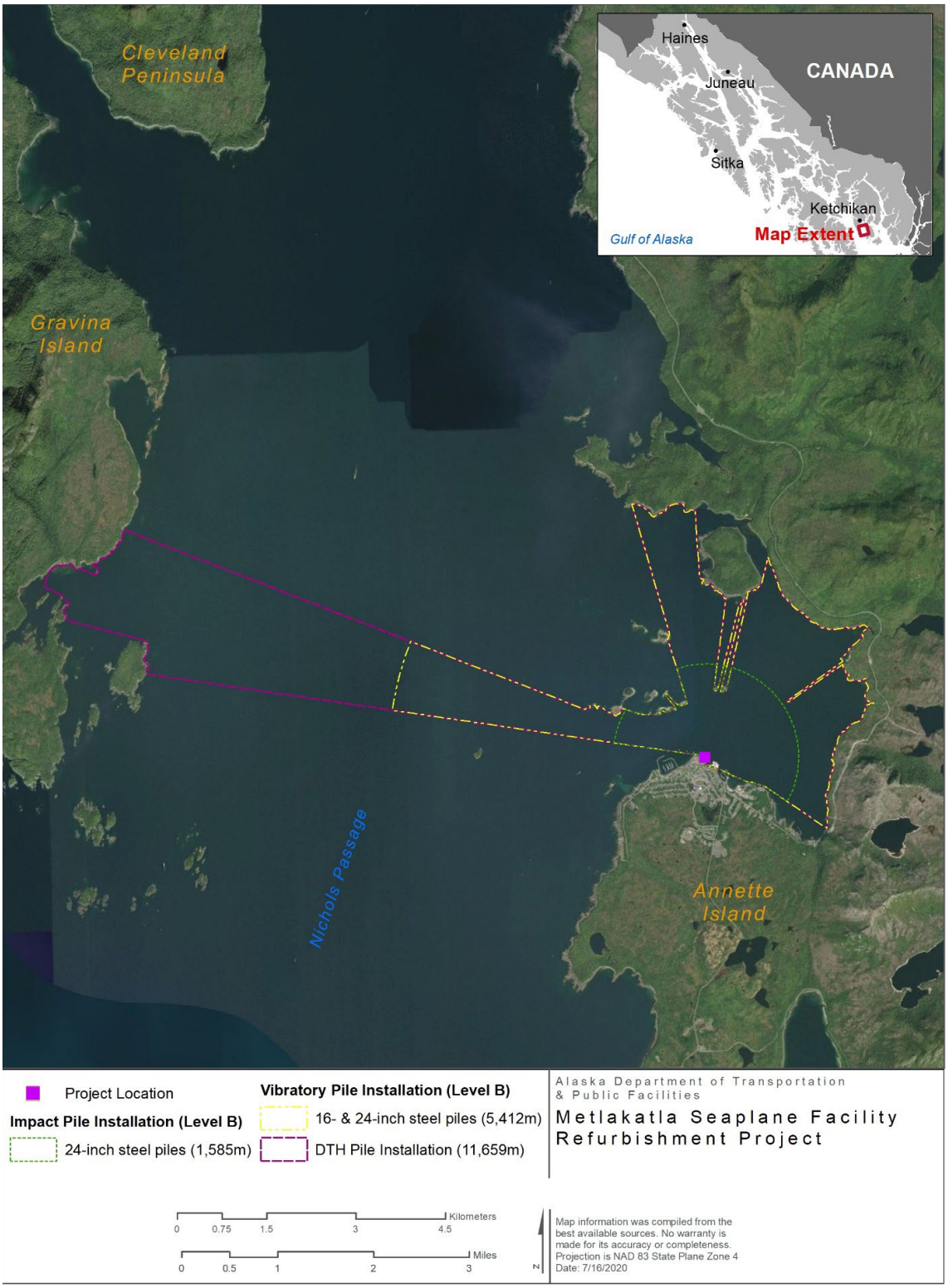

Figure 3. Action Area Metlakatla Seaplane Facility pile driving (HDR 2020b)

3. Approach to the Assessment

Section 7(a)(2) of the ESA requires Federal agencies, in consultation with NMFS, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. The jeopardy analysis considers both survival and recovery of the species. The adverse modification analysis considers the impacts to the conservation value of the designated critical habitat.

To jeopardize the continued existence of a listed species means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02). As NMFS explained when it promulgated this definition, NMFS considers the likely impacts to a species' survival as well as likely impacts to its recovery. Further, it is possible that in certain, exceptional circumstances, injury to recovery alone may result in a jeopardy biological opinion (51 FR 19926, 19934; June 3, 1986).

Under NMFS's regulations, the destruction or adverse modification of critical habitat means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species (50 CFR § 402.02).

We use the following approach to determine whether the proposed action described in Section 2 of this opinion is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Identify those aspects (or stressors) of the proposed action that are likely to have effects on listed species or critical habitat. As part of this step, we identify the action area – the spatial and temporal extent of these effects.
- Identify the rangewide status of the species and critical habitat likely to be adversely affected by the proposed action. This section describes the current status of each listed species and its critical habitat relative to the conditions needed for recovery. We determine the rangewide status of critical habitat by examining the condition of its PBFs - which were identified when the critical habitat was designated. Species and critical habitat status are discussed in Section 4 of this opinion.
- Describe the environmental baseline including: past and present impacts of Federal, state, or private actions and other human activities *in the action area*; expected impacts of proposed Federal projects that have already undergone formal or early section 7 consultation, and the impacts of state or private actions that are contemporaneous with the consultation in process. The environmental baseline is discussed in Section 5 of this opinion.
- Analyze the effects of the proposed action. Identify the listed species that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our *exposure analyses*). In this step of our analyses, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to stressors and the populations or subpopulations those individuals represent. NMFS also evaluates the proposed action's effects on critical habitat PBFs. The effects of the action are described in Section 6 of this opinion with the exposure analysis described in Section

6.2 of this opinion.

- Once we identify which listed species are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed species are likely to respond given their exposure (these represent our *response analyses*). Response analysis is considered in Section 6.3 of this opinion.
- Describe any cumulative effects. Cumulative effects, as defined in NMFS's implementing regulations (50 CFR § 402.02), are the effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation. Cumulative effects are considered in Section 7 of this opinion.
- Integrate and synthesize the above factors to assess the risk that the proposed action poses to species and critical habitat. In this step, NMFS adds the effects of the action (Section 6) to the environmental baseline (Section 5) and the cumulative effects (Section 7) to assess whether the action could reasonably be expected to: (1) appreciably reduce the likelihood of both survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat for the conservation of the species. These assessments are made in full consideration of the status of the species and critical habitat (Section 4). Integration and synthesis with risk analyses occurs in Section 8 of this opinion.
- Reach jeopardy and adverse modification conclusions. Conclusions regarding jeopardy and the destruction or adverse modification of critical habitat are presented in Section 9. These conclusions flow from the logic and rationale presented in the Integration and Synthesis Section 8.
- If necessary, define a reasonable and prudent alternative to the proposed action. If, in completing the last step in the analysis, NMFS determines that the action under consultation is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat, NMFS must identify a reasonable and prudent alternative (RPA) to the action.

4. Rangewide Status of the Species and Critical Habitat

This opinion considers the effects of the proposed action on the species and designated critical habitats specified in Table 4. One ESA-listed species under NMFS's jurisdication may occur in the action area: the threatened Mexico DPS humpback whale. No critical habitat for any ESA-listed species occurs within the action area. The nearest designated critical habitat for Mexico DPS humpback whales is approximately 520 nautical miles northwest of the action area and therefore would not be affected by the proposed action.

Table 4. Listing status and critical habitat designation for species considered in this opinion.

Species	Status	Listing	Critical Habitat
Humpback Whale, Mexico DPS *(Megaptera novaeangliae)*	Threatened	NMFS 2016, 81 FR 62260	NMFS 2021, 86 FR 21082

4.1 Climate Change

In accordance with NMFS guidance on analyzing the effects of climate change (Sobeck 2016), NMFS assumes that climate conditions will be similar to the status quo throughout the length of the direct and indirect effects of this project. We present an overview of the potential climate change effects on Mexico DPS humpback whales and their habitat below.

There is widespread consensus within the scientific community that atmospheric temperatures are increasing and that this will continue for at least the next several decades (Watson and Albritton 2001; Oreskes 2004). There is also consensus within the scientific community that climate change, exacerbated and accelerated by human activities, will alter current weather patterns and patterns associated with climatic phenomena, including the timing and intensity of extreme events such as heat waves, floods, storms, and wet-dry cycles. Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (Pachauri and Reisinger 2007). NOAA's climate information portal provides basic background information on these and other measured or expectexpected climate change effects (see https://www.climate.gov).

The Intergovernmental Panel on Climate Change (IPCC) estimated that average global land and sea surface temperature has increased by 0.6°C (±0.2) since the mid-1800s, with most of the change occurring since 1976. This temperature increase is greater than what would be expected given the range of natural climatic variability recorded over the past 1,000 years (Crowley 2000). The IPCC reviewed computer simulations of the effect of greenhouse gas emissions on observed climate variations that have been recorded in the past and evaluated the influence of natural phenomena such as solar and volcanic activity. Based on their review, the IPCC concluded that natural phenomena are insufficient to explain the increasing trend in land and sea surface temperature, and that most of the warming observed over the last 50 years is likely to be attributable to human activities (IPCC 2013).

Continued greenhouse gas emissions at or above current rates would cause further warming and

induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century (Watson and Albritton 2001). Climate change is projected to have substantial direct and indirect effects on individuals, populations, species, and the structure and function of marine, coastal, and terrestrial ecosystems in the foreseeable future (Houghton 2001; McCarthy 2001; Parry 2007). Climate change would result in increases in atmospheric temperatures, changes in sea surface temperatures, increased ocean acidity, changes in patterns of precipitation, and changes in sea level (IPCC 2013).

The indirect effects of climate change on Mexico DPS humpback whales would likely include changes in the distribution and abundance of prey, competitors, and/or predators. Although the linkage between climate change and future humpback whale prey production is not well understood to rate this as an extinction risk (see 81 FR 62275, September 8, 2016), the northeast Pacific marine heat wave (a recent oceanographic phenomenon symptomatic of climate change) is negatively correlated with humpback whale reproduction in Hawaii (Cartwright et al. 2019).

4.2 Status of Listed Species Likely to be Adversely Affected by the Action

For this action, the threatened Mexico DPS humpback whale is the only listed species that may be present in the action area. The status is determined by the level of extinction risk that the Mexico DPS humpback whale faces, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 CFR 402.02.

The sections below summarize information on the population structure and distribution of humpback whales in the action area to provide a foundation for the exposure analyses that appear later in this biological opinion. Then we summarize information on the threats to the species and the species' status given those threats to provide points of reference for the jeopardy determinations we make later in this biological opinion. That is, we rely on the species' status and trend to determine whether or not the action's effects are likely to increase the species' probability of becoming extinct or failing to recover.

More detailed background information on the status of the Mexico DPS humpback whale can be found in a number of published documents including stock assessment reports on Alaska marine mammals (Muto et al. 2020), the humpback whale status review (Bettridge et al. 2015), and a report on estimated abundance and migratory destinations for North Pacific humpback whales (Wade et al. 2016a).

In addition, PSO monitoring reports from the ADOT&PF Tongass Narrows project informed our estimates of the distribution and abundance of humpback whales in the action area (NMFS 2019).

4.2.1 Mexico DPS Humpback Whales (*Megaptera novaeangliae*)

Population Structure and Conservation Status

Humpback whales experienced large population declines in the early twentieth century due to commercial whaling operations, with an estimated population of approximately 1,200 animals in 1966 (Johnson and Wolman 1984). Humpback whales worldwide were designated as endangered under the Endangered Species Conservation Act in 1970 (35 FR 18319), and had been listed as a species under the ESA since its inception in 1973. On September 8, 2016, NMFS changed the status of humpback whales under the ESA (81 FR 62260), effective October 11, 2016. The decision recognized the existence of 14 DPSs based on distinct breeding areas in tropical and temperate waters. Five of the 14 DPSs were classified under the ESA (4 endangered and 1 threatened), while the other 9 DPSs were not listed.

The Mexico DPS is estimated at 2,806 individuals (CV of 0.055) (Wade 2017). The population of humpback whales from both the Hawaii and Mexico DPSs that are found in the summer feeding grounds of Southeast Alaska is approximately 6,137 individuals (95% CI = 5,352–7,038; (Wade et al. 2016a). Current threats to humpback whales include vessel strikes, spills, climate change, and commercial fishing operations (Muto et al. 2020).

Specific areas are designated as critical habitat for the Mexico DPS of humpback whales in the North Pacific Ocean, including portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem. The critical habitat designation is based primarily on abundance and availability of prey items. No critical habitat is designated within the action area.

Distribution

Humpback whales are found throughout Southeast Alaska in a variety of marine environments, including open ocean, nearshore waters, and areas with strong tidal currents (Dahlheim et al. 2009). Humpback whales migrate to Southeast Alaska in spring to feed after months of fasting in breeding grounds such as Hawaii and Mexico. Peak abundance of humpback whales in Southeast Alaska typically occurs during late summer to early fall. Most humpback whales begin returning to southern breeding grounds in fall or winter. However, due to temporal overlap between whales departing and returning, humpbacks can be found in Alaska feeding grounds in every month of the year (Baker et al. 1985; Straley 1990). It is also common for some humpback whales to overwinter in areas of Southeast Alaska including near Sitka and Juneau (National Park Service Fact Sheet available at http://www.nps.gov/glba). It is thought that those humpbacks that remain in Southeast Alaska do so in response to the availability of winter schools of fish prey, such as herring (Straley 1990).

The probability of encountering whales from each of the four North Pacific DPSs in various feeding areas is summarized in Table 5 below (NMFS 2016). Only whales from the Mexico and Hawaii DPSs are likely to be present in the action area (NMFS 2016) . The abundance estimate for humpback whales in Southeast Alaska is estimated to be 6,137 (CV= 0.07) animals, which includes whales from the Hawaii DPS (94%) and Mexico DPS (6%) (Wade et al. 2016a). Humpback whales found in the action area are predominantly members of the Hawaii DPS. However, based on a comprehensive photo-identification study, members of the Mexico DPS,

which is listed as threatened, are known to occur in Southeast Alaska.

Table 5. Probability of encountering humpback whales from each DPS in the North Pacific Ocean in various feeding areas. Adapted from Wade et al. (2016).

Summer Feeding Areas	North Pacific Distinct Population Segments			
	Western North Pacific DPS (endangered)[1]	Hawaii DPS (not listed)	Mexico DPS (threatened)	Central America DPS (endangered)[1]
Kamchatka	100%	0%	0%	0%
Aleutian Is/ Bering/Chukchi	4.4%	86.5%	11.3%	0%
Gulf of Alaska	0.5%	89%	10.5%	0%
Southeast Alaska/ Northern BC	0%	93.9%	6.1%	0%
Southern BC/WA	0%	52.9%	41.9%	14.7%
OR/CA	0%	0%	89.6%	19.7%

[1] For the endangered DPSs, these percentages reflect the 95% confidence interval of the probability of occurrence in order to give the benefit of the doubt to the species and to reduce the chance of underestimating potential takes.

Humpback Whales in the Action Area

Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia, particularly during the summer months. Humpback whale populations in Southeast Alaska have been steadily increasing in recent decades. Humpback whale abundance has increased by at least an estimated annually 6.8% in the North Pacific in the 39 years following the cessation of commercial whaling in the United States (Calambokidis et al. 2008). The annual rate of increase of humpback whale abundance in Southeast Alaska was estimated to be 10.6% from 1991-2007 (Dahlheim et al. 2009), and recent estimates of abundance for Southeast Alaska and northern British Columbia are between 3,000 and 6,137 humpback whales (Calambokidis et al. 2008; Wade et al. 2016b; Muto et al. 2019). No systematic studies have documented humpback whale abundance near Metlakatla. Anecdotal information (e.g. tour boat captains) from Metlakatla and Ketchikan suggest that humpback whales' utilization of the area is intermittent year-round with abundance highest in August and September (84 FR 34134). During fall 2018, Ketchikan Airport staff and ferry captains reported an increase in the frequency of occurrence of humpback whales in the vicinity of the Tongass Narrows Project. More recently, marine mammal monitoring for the ADOT&PF Tongass

Narrows project detected daily occurrences of a single humpback whale in Tongass Narrows for several weeks during November 2020. The abundance, distribution, and occurrence of humpback whales are likely dependent on and fluctuate with fish prey. NMFS estimated that approximately four humpback whales may transit through nearby Tongass Narrows each week (84 FR 34134). However, anecdotal reports suggest that humpback whale abundance is higher and occurrence is more regular in Metlakatla.

Threats to the Species

Algal toxins

Harmful algal blooms are a potential stressor for humpback whales. Out of 13 stranded marine mammal species sampled in Alaska, domoic acid was detected in all species examined with humpback whales showing 38% prevalence. Saxitoxin was detected in 10 of the 13 species, with the highest prevalence in humpback whales (50%) and bowhead whales (32%) (Lefebvre et al. 2016). Domoic acid has caused marine mammal illness and mortality on the West Coast of the United States, and saxitoxin is a known cause of human illness and mortality in Alaska. Both are expected to increase in association with current climate trends (i.e., increasing water temperatures) (Lefebvre et al. 2016).

Entanglement

Humpback whales can be killed or injured in interactions with commercial fishing gear and other entanglements. A photography study of humpback whales in Southeast Alaska in 2003 and 2004 found at least 53% of individuals showed some kind of scarring from past entanglements (Neilson 2006).

The minimum estimate of the mean annual mortality and serious injury rate incidental to U.S. commercial fisheries for the Central North Pacific stock (CNP: which includes whales from the Hawaii DPS, Mexico DPS, and Western North Pacific DPS) in 2012-2016 is 9.9 humpback whales. This estimate is based on observer data from Alaska (0.2 in federal fisheries + 5.5 in the state-managed Southeast Alaska salmon drift gillnet fishery), observer data from Hawaii (0.9), Marine Mammal Authorization Program (MMAP) fishermen self-reports, and reports to the NMFS Alaska Region stranding network in which the commercial fishery is confirmed, (Muto et al. 2019). During this same time period, an additional annual estimated rate of CNP humpback mortality or serious injury in Alaska included 0.4 whales per year entangled in recreational fishing gear, 0.5 entangled in subsistence fisheries, 1.4 entangled in unknown fishing gear (commercial, recreational, or subsistence), 2.6 entangled in marine debris, and 0.6 entangled in other gear (ship's ground tackle, salmon net pen, mooring gear) (Muto et al. 2019). These estimates are based on confirmed reports and are certainly minimums for humpback whale mortality and serious injury (Muto et al. 2019).

Vessel Collisions

Ship strikes and other interactions with vessels unrelated to fisheries occur frequently with humpback whales. Between 2012-2016, the estimated mean morality rate to CNP humpback whales from ship strike was 2.5 animals per year (Muto et al. 2019). Neilson et al. (2012a)

summarized 108 large whale ship strikes in Alaska from 1978 to 2011, 25 of which are known to have resulted in the whale's death. Eighty-six percent of these reports involved humpback whales. Most ship strikes of humpback whales in Alaska are reported from Southeast Alaska (Muto et al. 2019).

In 2017, there were eight reported vessel strikes to large whales in Alaska; six confirmed humpback whales, one unknown large whale, and one sperm whale. In 2018, there were nine reported vessel strikes to large whales in Alaska; seven humpback whales, one gray whale, and one fin whale (AKR Stranding Program Vessel Strike database; accessed by M. Keogh on January 2021). These reports are a minimum number of whale vessel strikes in Alaska (Laist et al. 2001).

Vessel collisions with humpback whales remain a significant management concern, given the increasing abundance of humpback whales foraging in Alaska, as well as the growing presence of marine traffic in Alaska's coastal waters. Based on these factors, injury and mortality of humpback whales as a result of vessel strike will continue into the future.

Anthropogenic Noise

Elevated levels of sound from anthropogenic sources (e.g., shipping, military sonars, coastal development) are a potential concern for humpback whales in the North Pacific, as well as the growth of the whale watching industry (preferred habitats may be abandoned if disturbance levels are too high) (Muto et al. 2019). Abandonment of preferred habitats could lead to decreases in fitness if the whales do not have access to food or resting areas.

Reproduction and Growth

Humpbacks give birth and presumably mate on low-latitude wintering grounds in January to March in the Northern Hemisphere. Females attain sexual maturity at 5 years in some populations and exhibit a mean calving interval of approximately two years (Clapham 1992; Barlow and Clapham 1997). Gestation is about 12 months, and calves probably are weaned by the end of their first year (Perry et al. 1999).

Feeding and Prey Selection

Humpback whales tend to feed on summer grounds and not on winter grounds. However, some opportunistic winter feeding has been observed at low latitudes (Perry et al. 1999). Humpback whales engulf large volumes of water and then filter small crustaceans and fish through their fringed baleen plates.

Humpback whales are relatively generalized in their feeding compared to some other baleen whales. In the Northern Hemisphere, known prey includes: euphausiids (krill); copepods; herring; juvenile salmonids; Arctic cod; walleye pollock; pteropods; and cephalopods (Johnson and Wolman 1984; Perry et al. 1999; Straley et al. 2018). Foraging is confined primarily to higher latitudes (Stimpert et al. 2007).

Diving and Social Behavior

In Hawaiian waters, humpback whales remain almost exclusively within the 1800 m isobath and usually within water depths less than 182 meters. Maximum diving depths are approximately 170 m (558 ft) (but usually <60 m [197 ft]), with a very deep dive (240 m [787 ft]) recorded off Bermuda (Hamilton et al. 1997). They may remain submerged for up to 21 min (Dolphin 1987). Whales observed feeding on Stellwagen Bank dove <40 m (Hain et al. 1995). In Southeast Alaska average dive times were 2.8 min for feeding whales, 3.0 min for non-feeding whales, and 4.3 min for resting whales, with the deepest dives to 148 m (Dolphin 1987). Because most humpback prey is likely found above 300 m depths most humpback dives are probably relatively shallow. Hamilton et al. (1997) tracked one possibly feeding whale near Bermuda to 240 m depth.

In a review of the social behavior of humpback whales, Clapham (1996) reported that they form small, unstable social groups during the breeding season. During the feeding season they form small groups that occasionally aggregate on concentrations of food. Feeding groups are sometimes stable for long periods of time. There is good evidence of some territoriality on feeding grounds (Clapham 1994; Clapham 1996) and calving areas (Tyack 1981).

Vocalization, Hearing, and Other Sensory Capabilities

While there is no direct data on hearing in low-frequency cetaceans, the functional hearing range is expected to be between 7 Hz to 35 kHz (Watkins 1986; Au et al. 2006; Southall et al. 2007a; Ciminello et al. 2012; NMFS 2016). Baleen whales have inner ears that appear to be specialized for low-frequency hearing. In a study of the morphology of the mysticete auditory apparatus, Ketten (1997) hypothesized that large mysticetes have acute infrasonic hearing.

Humpback whales produce at least three kinds of sounds:

1. Complex songs with components ranging from at least 20 Hz–24 kHz with estimated source levels from 144–174 dB; these are mostly sung by males on the breeding grounds Central North Pacific stock (CNP (Winn et al. 1970; Richardson et al. 1995; Frazer and Mercado 2000; Au et al. 2006);
2. Social sounds in the breeding areas that extend from 50Hz – more than 10 kHz with most energy below 3kHz (Tyack and Whitehead 1983; Richardson et al. 1995). These sounds appear to have an effective range of up to 9 km (Tyack and Whitehead 1983); and
3. Feeding area vocalizations that are less frequent, but tend to be 20 Hz–2 kHz with estimated sources levels in excess of 175 dB re 1 Pa at 1m (Thompson et al. 1986; Richardson et al. 1995).

Humpback whales are in the low frequency (LF) cetacean function hearing group (Southall et al. 2007a).

5. Environmental Baseline

The “environmental baseline” refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical

habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action areas that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR § 402.02).

Focusing on the impacts of activities specifically within the action area allows us to assess the prior experience and condition of the animals that will be exposed to effects from the actions under consultation. This focus is important because individuals of ESA-listed species may commonly exhibit, or be more susceptible to, adverse responses to stressors in some life history states, stages, or areas within their distributions than in others. These localized stress responses or baseline stress conditions may increase the severity of the adverse effects expected from proposed actions.

The project vicinity is an area of moderate human use and habitat alteration. Ongoing human activity in the action area that impacts marine mammals includes marine vessel activity, pollution, climate change, noise (e.g., aircraft, vessel, pile-driving, etc.), and coastal zone development.

5.1 Recent Biological Opinions for Projects in the Action Area

NMFS has not issued biological opinions for construction in Metlakatla however a number of biological opinions for construction projects in Tongass Narrows in recent years include:

- Ketchikan Berth IV Dock Upgrades (PCTS #AKR-2018-9764), Ketchikan Dock Company, July 2018.
- Tongass Narrows (Gravina Access) Project (ECO # AKRO-2019-03432), Alaska Department of Transportation and Public Facilities, December 2019.
- Berth II Rock Pinnacle Removal Project (ECO # AKRO-2019-00553), City of Ketchikan, July 2019.
- Berth III Mooring Dolphins Project (ECO# AKRO-2020-02183), City of Ketchican, February 2021.

These biological opinions are available on the NMFS Alaska Region website at: https://www.fisheries.noaa.gov/alaska/consultations/section-7-biological-opinions-issued-alaska-region.

5.2 Stressors on Humpback Whales

5.2.1 Vessel Disturbance and Strike

Vessel-based recreational activities, commercial fishing, shipping, whale-watching, the Alaska Marine Highway System (AMHS), and general transportation regularly occur within the action

area. Depending on the season, AHMS may make 1-2 trips a day between Annette Bay and Ketchikan. The waters of the Inside Passage support marine cargo transportation. According to automatic identification system passage-line data plots obtained from the Marine Exchange of Alaska, in 2011, 1,489 vessels moved north or south between Alaska and British Columbia. The data show that 288 vessels moved east or west between the Dixon Entrance and the Pacific Ocean during the year. Cargo ships calling at Prince Rupert dominated the east-west large vessel traffic. Cruise ships, tugs, and ferries dominated the north-south traffic (Nuka Research and Planning Group 2012). All of these sources of vessel traffic increase underwater noise and contribute to the risk of vessel-whale collisions.

Neilson et al. (2012b) found most vessel strikes between 1978 and 2011 occurred in southeastern Alaska and between May and September. The type of vessel and speed varied with most vessels being less than 49 feet long traveling at speeds over 13 knots when the whale strike occurred. The great majority of vessel strikes involved humpback whales and increased annually by 5.8% from 1978 to 2011. The NMFS Alaska Marine Mammal Stranding Network database has records of 96 confirmed vessel strikes involving large whales between 2005 and 2019, 60% occurred within Southeast Alaska and 58 involved humpback whales[1]. Within the action area, 2 vessel strikes were reported within Dixon entrance (2010, 2018) and an additional 3 vessel strikes were near Ketchikan and all involved humpback whales.

NMFS implemented regulations to minimize harmful interactions between ships and humpback whales in Alaska (see 50 CFR §§ 216.18, 223.214, and 224.103(b)). Since 2011, cruise lines, pilots, NMFS, and National Park Service (NPS) biologists have worked together to produce weekly whale sightings maps to improve situational awareness for cruise ships and state ferries in Southeast Alaska. In 2016, NMFS and NPS launched Whale Alert, another voluntary program that receives and shares real-time whale sightings with controlled access to reduce the risk of ship strike and contribute to whale avoidance. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.

5.1.1 Fishery Interactions Including Entanglements

Entanglement of marine mammals in fishing gear and other human-made material is a major threat to their survival worldwide. Other materials also pose entanglement risks including marine debris, mooring lines, anchor lines, and underwater cables. While in many instances, marine mammals may be able to disentangle themselves (see Jensen et al. 2009), other entanglements result in lethal and sublethal trauma to marine mammals including drowning, injury, reduced foraging, reduced fitness, and increased energy expenditure (van der Hoop et al. 2016).

The NMFS Alaska Marine Mammal Stranding Network database has records of 224 large whale entanglements between 2000 and 2020[2]. Of these, 64% were humpback whales from Southeast Alaska. Most of these whales were entangled with gear between the beginning of June and the beginning of September, when they were on their nearshore foraging grounds in Alaska waters. Between 2000 and 2020, 20% of humpback entanglements in Southeast Alaska were with pot gear and 30% with gillnet gear, and < 1% were associated with longline gear. Humpback whales

[1] NMFS Alaska Marine Mammal Stranding Network database, accessed November 5, 2020.
[2] NMFS Alaska Marine Mammal Stranding Network database, accessed November 5, 2020.

have been reported as entangled in the action area or near the action area in recent years, including an entanglement reported near Annette Island in 2015 and near Metlakatla in 2008 and 2018 and two near Ketchikan in 2011 and one near Gravina Island in 2019.

Based on events that have not been attributed to a specific fishery listed on the 2020 MMPA List of Fisheries (85 FR 21079; April 16, 2020), the minimum mean annual mortality and serious injury rate from gear entanglements in unknown fisheries is 7.7 humpback whales for the CNP stock 2013-2017 (Muto et al. 2020).

The minimum average annual mortality and serious injury rate due to interactions with all fisheries in 2013-2017 is 18 Central North Pacific humpback whales (9.5 in commercial fisheries + 0.4 in recreational fisheries + 0.4 in subsistence fisheries + 7.7 in unknown fisheries), and 1.3 Western North Pacific humpback whales (0.7 in commercial fisheries + 0.4 in recreational fisheries + 0.2 in unknown fisheries) (Muto et al. 2020). All events occurred within the area of known overlap between stocks. Since the stock is unknown, the mortality and serious injury is reflected in the stock assessment reports for both stocks.

Commercial fisheries may indirectly affect whales by reducing the amount of available prey or affecting prey species composition.

5.1.2 Pollution

No known contaminant sites are located within the village of Metlakatla or on Annette Island. Two active cleanup sites are found across Nichols Passage on Gravina Island and a number of completed historically contaminated sites on Revillagigedo Island are listed on the Alaska Department of Environmental Conservation's (ADEC) Contaminated Sites Database[3].

5.1.3 Climate Change

As discussed in Section 4.2, there is widespread consensus within the scientific community that atmospheric temperatures on earth are increasing. Recent studies and observations have shown changes in distribution (Brower et al. 2018), body condition (Neilson and Gabriele 2020), and migratory patterns of humpback whales, likely in response to climate change. The indirect effects of climate change on Mexico DPS humpback whales over time would likely include changes in the distribution of ocean temperatures suitable for many stages of their life history, the distribution and abundance of prey, and the distribution and abundance of competitors or predators.

5.2 Coastal Zone Development

Coastal zone development results in the loss and alteration of nearshore marine mammal habitat and changes in habitat quality. Increased development may prevent marine mammals from reaching or using important feeding, breeding, and resting areas. The shoreline at the project site is moderately developed, with man-made structures and impervious surfaces at the shoreline. The village of Metlakatla is located on the south shore of Port Chester on Annette Island. The

[3] ADEC website, accessed May 26, 2021, available at https://dec.alaska.gov/spar/csp/

coastline of Annette Island remains largely undeveloped. The shoreline of Gravina and Pennock Island closest to Metlakatla is also undeveloped, though there is moderate shoreline development on these islands near the city of Ketchikan. Within the project area, there is little coastline area that has not been impacted by human development. Marine facilities include fish processing plants, small boat harbors, ferry terminal, float plane docks, and other infrastructure.

Underwater background sounds originate from anthropogenic sources such as coastal construction, seafood processing facilities, aircraft, upland vehicle traffic and vessels including recreational vessels, passenger ferries, commercial freight vessels/barges, cruise ships, charter vessels and commercial fishing vessels. Natural sounds consist of marine mammal and fish sounds and surface-generated wind and waves.

Because responses to anthropogenic noise vary among species and individuals within species, it is difficult to determine long-term effects to humpback whales in the action area. Habitat abandonment due to anthropogenic noise exposure has been found in terrestrial species (Francis and Barber 2013). Clark et al. (2009) identified increasing levels of anthropogenic noise as a habitat concern for whales because of its potential effect on their ability to communicate (i.e., masking). Some research (Parks 2003; McDonald et al. 2006; Parks 2009) suggests marine mammals compensate for masking by changing the frequency, source level, redundancy, and timing of their calls. However, the long-term implications of these adjustments, if any, are currently unknown.

6. Effects of the Action

"Effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR § 402.02).

This biological opinion relies on the best scientific and commercial information available. We try to note areas of uncertainty, or situations where data is not available. In analyzing the effects of the action, NMFS gives the benefit of the doubt to the listed species by minimizing the likelihood of false negative conclusions (concluding that adverse effects are not likely when such effects are, in fact, likely to occur).

We organize our effects analysis using a stressor identification – exposure – response – risk assessment framework for the proposed activities.

We conclude this section with an *Integration and Synthesis of Effects* that integrates information presented in the *Status of the Species* and *Environmental Baseline* sections of this opinion with the results of our exposure and response analyses to estimate the probable risks the proposed action poses to endangered and threatened species.

NMFS identified and addressed all potential stressors; and considered all consequences of the proposed action, individually and cumulatively, in developing the analysis and conclusions in

this opinion regarding the effects of the proposed action on ESA-listed species and designated critical habitat.

6.1 Project Stressors

Stressors are any physical, chemical or biological phenomena that can induce an adverse response. The effects section starts with identification of the stressors produced by the constituent parts of the proposed action.

Based on our review of the BA(HDR 2020b), the IHA application(HDR 2020a), the 2/23/21 project changes memo, additional personal communications, and available literature as referenced in this biological opinion, our analysis recognizes that the proposed action may cause these primary stressors:

- Underwater noise produced by impulsive and continuous noise sources related to pile driving activities including vibratory pile driving and removal, impact pile driving, and down-the-hole drilling;
- Injury or disturbance due to vessel traffic or vessel noise;
- Disturbance to seafloor, marine mammal habitat, and marine mammal prey; and
- Pollution from unauthorized spills.

6.1.1 Minor Stressors on ESA-Listed Species

Based on a review of available information, we determined the following stressors are either unlikely to occur or likely to have minimal impacts on Mexico DPS humpback whales.

6.1.1.1 Vessel strike

Vessel strike associated with the proposed action is extremely unlikely. Project vessels are expected to consist of one 200’ to 250’ work barge, one 200’-250’ material barge, one tugboat, 2 or more work skiffs, and the 20’ seaplane base shuttle. The barges will remain anchored on-site during construction, making only minor adjustments in position as required to perform the work.

Vessel activity is common throughout the action area. Most ship strikes of large whales occur when vessels are traveling at speeds of 10 knots or more (Laist et al. 2001; Jensen and Silber 2004). Tug towing operations for construction occur at relatively low speeds (5 knots), and project-related vessels will not exceed 10 knots within the action area. All vessels associated with the project will follow well-established, frequently used navigation lanes within the action area.

Between 2013 and 2017 the minimum mean annual mortality and serious injury rate due to ship strikes reported in Alaska for humpback whales was 2.3 whales (Muto et al. 2020). These incidents account for a very small fraction of the total humpback whale population (Laist et al. 2001). Of the reported vessel strikes of humpback whales in the Ketchikan vicinity between 2007 and 2017, one was reported within Tongass Narrows. That whale arrived in the Ketchikan Harbor on the bulbous bow of a cruise ship when it came into port, but it is uncertain if it was struck in Tongass Narrows or elsewhere.

The seaplane facility will not likely result in an increase in marine vessel traffic. The effects of this marginal increase in vessel traffic on Mexico DPS humpback whales would be temporary and too small to detect or measure and is therefore inconsequential.

Vessel disturbance or strikes of Mexico DPS humpback whales are not expected as a result of the proposed action because 1) vessel traffic associated with the project is minimal; 2) relatively few humpback whales use the waters of Port Chester and Nichols Passage; 3) only about 6.1 percent of humpback whales that occur in the area are from the listed Mexico DPS; 4) all project vessels are limited to a speed of less than 10 knots in the action area; and 5) vessels will adhere to the Alaska Humpback Whale Approach Regulations when transiting to and from the project site (see 50 CFR §§ 216.18, 223.214 and 224.103(b)) that prohibit approaching within 100 yards of humpback whales. All of these factors limit the risk of strike; therefore, we conclude that vessel strike is extremely unlikely to occur.

6.1.1.2 Vessel noise

Ferry services out of Port Chester operate twice daily, five days a week between Metlakatla and Ketchikan. There are two additional small boat harbors and a barge dock. Vessel noise transmitted through water is a continuous noise source. Broadband source levels for tugs and barges have been measured at 145 to 170 dB_{rms} re 1 µPa, and 151 to 152 dB_{rms} re 1µPa for small vessels with outboard motors (Richardson et al. 1995). Sound from vessels within this size range would reach the 120 dB threshold at distances between 86 m and 233 m (282 and 764 feet) from the source (Richardson et al. 1995).

Vessel noise associated with this action will be minimal because most work will be conducted from anchored barges and work platforms.NMFS expects minimal low-level exposure of short-term duration to listed humpback whales from vessel noise related to this action. If animals are exposed and do respond, they may exhibit slight deflection from the noise source and engage in low-level avoidance behavior, short-term vigilance behavior, or short-term masking behavior, but these behaviors are not likely to result in adverse consequences for the animals. The nature and duration of response is not expected to be a significant disruption of important behavioral patterns such as feeding or resting. The action area is not considered high quality habitat for humpback whales so slight avoidance of the area is not likely to adversely affect them. The few vessels involved in the action will travel only short distances at slow speeds. Additionally, the infrequent occurrence of humpback whales in the action area, adherence to the mitigation measures, and vessels following the Alaska Humpback Whale Approach Regulations should minimize close approaches and exposure to noise from vessels related to this action. Following construction of the project, levels of aircraft traffic at the Metlakatla Seaplane Facility are not expected to change. Noise from seaplane and vessel activity is expected to remain at current levels. The impact of vessel noise on Mexico DPS humpback whales is therefore determined to be minimal.

6.1.1.3 Disturbance to seafloor, habitat, and prey resources

The proposed action will have temporary impacts on water quality (increases in turbidity levels) and on prey species distribution. Pile driving may cause temporary and localized turbidity through sediment disturbance. Turbidity plumes during pile installation and removal will be localized

around the pile. Due to temporary, localized, and low levels of turbidity increases, it is not expected that turbidity would result in immediate or long-term effects to the Mexico DPS humpback whale or their prey.

Construction activities would produce continuous (i.e., vibratory pile driving and drilling) and impulsive (i.e., impact driving) sounds. Fish react to sounds that are especially strong and/or intermittent low-frequency sounds. Short duration, sharp sounds can cause overt or subtle changes in fish behavior and local distribution. Hastings and Popper (2005) identified several studies that suggest fish may relocate to avoid certain areas of sound energy. Additional studies have documented effects of pile driving on fish, although several are based on studies related to large, multiyear bridge construction projects (e.g., Scholik and Yan 2001; Scholik and Yan 2002; Popper and Hastings 2009). Impulsive sounds at received levels of 160 dB may cause subtle changes in fish behavior. SPLs of 180 dB may cause noticeable changes in behavior (Pearson et al. 1992; Skalski et al. 1992). SPLs of sufficient strength have been known to cause injury to fish and fish mortality.

The most likely impact to fish from pile driving and drilling activities at the project area would be temporary behavioral avoidance of the area. The duration of fish avoidance of this area after pile driving ceases is unknown, but a rapid return to normal recruitment, distribution and behavior is expected. In general, impacts to marine mammal prey species are expected to be minor and temporary given the small area of pile driving within the action area relative to known feeding areas for humpback whales. In general, we expect fish will be capable of moving away from project activities to avoid exposure to noise. We expect the area in which stress, injury, TTS, or changes in balance of prey species may occur will be limited to a few meters directly around the pile driving and drilling operations. We consider potential adverse impacts to prey resources from pile-driving and drilling in the action area to be unlikely.

Studies on euphausiids and copepods, two of the more abundant and biologically important groups of zooplankton, have documented some sensitivity of zooplankton to sound (Chu et al. 1996; Wiese 1996); however, any effects of pile driving and drilling activities on zooplankton would be expected to be restricted to the area within a few feet or meters of the project and would likely be sub-lethal.

No appreciable adverse impact on zooplankton populations will occur due in part to large reproductive capacities and naturally high levels of predation and mortality of these populations. Any mortality or impacts on zooplankton as a result of construction operations is immaterial as compared to the naturally-occurring reproductive and mortality rates of these species. This is consistent with previous conclusions that crustaceans (such as zooplankton) are not particularly sensitive to sound produced by even louder impulsive sounds such as seismic operations (Wiese 1996).

Construction activities will temporarily increase in-water noise and may adversely affect prey in the action area. The timing of in-water construction, with work expected starting in Fall 2021 and lasting 2 months, will avoid major spawning and migration times. Adverse effects on prey species populations during project construction will be short-term, based on the short duration of the project. After pile driving activities are completed, habitat use and function are expected to return to similar pre-construction levels and fish are expected to repopulate the area.

Given the numbers of fish and other prey species in the vicinity, the short-term nature of effects on fish species, and the mitigation measures to protect fish and marine mammals during construction, the proposed action is not expected to have measurable effects on the distribution or abundance of potential marine mammal prey species. Any behavioral avoidance by fish of the disturbed area would still leave sufficiently large areas of fish and marine mammal foraging habitat outside the action area.

There are no known aggregations of forage fish important to humpback whales in the project vicinity that will be impacted by the action. The three anadromous streams in Port Chester are outside the threshold of noise propogation that would cause injury to fish. ADOT&PF will limit the use of impact (impulsive) pile installation methods to brief (15 minutes) periods of proofing for each pile. This will reduce the potential for injury to salmon as a result of impulsive underwater noise.In summary, the effects of disturbance to the seafloor, habitat, and prey resources resulting from the seaplane dock replacement activities are expected to have a negligible impact on Mexico DPS humpback whales.

6.1.1.4 Introduction of pollutants into waters

Measures to prevent spills of oil and other pollutants as described in Section 2.1.2 of this opinion will be implemented during construction. Plans will be in place and materials available for spill prevention and cleanup activities at the marine terminal to limit potential contamination. Construction will be conducted in accordance with Clean Water Act Section 404 and 401 regulations to minimize potential construction-related impacts on water quality, and any effects to Mexico DPS humpback whales would be immeasurably small. Therefore, we conclude that the effects from this stressor are negligible.

6.1.1.5 Summary of Minor Stressors on ESA-listed Species

In conclusion, based on review of available information, we determined effects from vessel strike and disturbance are extremely unlikely to occur. We consider the effects to Mexico DPS humpback whales to be negligible.

We determined vessel noise associated with the action is not likely to have measurable impact; therefore, we consider the effects to Mexico DPS humpback whales to be negligible.

We determined disturbance to seafloor, habitat, and prey resources, and introduction of pollutants are not likely to have measurable impact; therefore, we consider the effects to Mexico DPS humpback whales to be negligible.

Although these stressors are considered minor with negligible effects to listed species, the effects of these stressors are considered and addressed in the *Integration and Synthesis* portion of the opinion.

6.1.2 Major Stressors on ESA-Listed Species

The most consequential effects of the proposed action on Mexico DPS humpback whales would result from impulsive and continuous noise sources related to vibratory pile driving and removal, impact pile driving, and down-the-hole drilling.

6.1.2.1 Description of sound sources

The marine soundscape is comprised of both ambient and anthropogenic sounds. Ambient sound is defined as the all-encompassing sound in a given place and is usually a composite of sound from many sources both near and far. The sound level of an area is defined by the total acoustic energy being generated by known and unknown sources. These sources may include physical (e.g., waves, wind, precipitation, earthquakes, ice, atmospheric sound), biological (e.g., sounds produced by marine mammals, fish, and invertebrates), and anthropogenic sound (e.g., vessels, dredging, aircraft, construction).

Natural sound sources at any given location and time comprise "ambient" sound, while the sum of ambient sounds and typical anthropogenic sound comprises the "background" sound. Received levels of ambient and background sound depends not only on the source levels (as determined by current weather conditions and levels of biological and shipping activity) but also on the ability of sound to propagate through the environment. In turn, sound propagation is dependent on the spatially and temporally varying properties of the water column and sea floor, and is frequency-dependent. As a result of the dependence on a large number of varying factors, ambient sound levels can be expected to vary widely over both coarse and fine spatial and temporal scales. Sound levels at a given frequency and location can vary by 10-20 dB from day to day (Richardson et al. 1995). The result is that, depending on the source type and its intensity, sound from the specified activity may be a negligible addition to the local environment or could form a distinctive signal that may affect marine mammals.

In-water construction activities associated with the project would include vibratory pile driving and pile removal, impact pile driving, and DTH pile installation. The sounds produced by these activities fall into one of two general sound types: impulsive and non-impulsive. Impulsive sounds (e.g., explosions, gunshots, sonic booms, impact pile driving) are typically transient, brief (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI (American National Standards Institute) 1986; NIOSH (National Institute for Occupational Safety and Health) 1998; ANSI (American National Standards Institute) 2005; NMFS 2018a). Non-impulsive sounds (e.g. aircraft, machinery operations such as drilling or dredging, vibratory pile driving, and active sonar systems) can be broadband, narrowband or tonal, brief or prolonged (continuous or intermittent), and typically do not have the high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998; NMFS 2018). The distinction between these two sound types is important because they have differing potential to cause physical effects, particularly with regard to hearing (Southall et al. 2007a)(e.g., Ward 1997 in Southall et al., 2007).

Impact hammers operate by repeatedly dropping a heavy piston onto a pile to drive the pile into the substrate. Sound generated by impact hammers is characterized by rapid rise times and high peak levels, a potentially injurious combination (Hastings and Popper 2005). Vibratory hammers install piles by vibrating them and allowing the weight of the hammer to push them into the sediment. Vibratory hammers produce significantly less sound than impact hammers. Peak sound pressure levels (SPLs) may be 180 dB or greater, but are generally 10 to 20 dB lower than SPLs generated during impact pile driving of the same-sized pile (Oestman et al., 2009). Rise time is slower, reducing the probability and severity of injury, and sound energy is distributed over a greater amount of time (Nedwell and Edwards 2002; Carlson et al., 2005).

A DTH hammer drill is used to place hollow steel piles or casings by drilling. A DTH hammer drill is a drill bit that drills through the bedrock using a pulse mechanism that functions at the bottom of the hole. This pulsing bit breaks up rock to allow removal of debris and insertion of the pile. The head extends so that the drilling takes place below the pile. The pulsing sounds produced by DTH hammer drills were previously thought to be continuous. However, recent sound source verification (SSV) monitoring has shown that DTH hammer drill can create sound that can be considered impulsive (Denes et al. 2019). Therefore, NMFS characterizes sound from DTH pile installation as being impulsive when evaluating potential Level A harassment (i.e., injury) impacts and as being non-impulsive when assessing potential Level B harassment (i.e., behavior) effects.

Tension anchors will be installed in each of the six permanent piles. The purpose of a tension anchor is to secure the pile to the bedrock to withstand uplift forces. Tension anchors are installed within piles that are drilled into the bedrock below the elevation of the pile tip after the pile has been driven through the sediment layer to refusal. A 6- or 8-inch-diameter steel pipe casing will be inserted inside the larger-diameter production pile. A rock drill will be inserted into the casing, and a 6- to 8-inch-diameter hole will be drilled into bedrock with rotary and percussion drilling methods. The drilling work is contained within the steel pile casing and the steel pipe pile. The typical depth of the drilled hole varies, but 20–30 feet is common. Rock fragments will be removed through the top of the casing with compressed air. A steel rod will then be grouted into the drilled hole and affixed to the top of the pile. It is estimated that tension anchor installation will take about 1–2 hours per pile. Noise generated from tension anchor installation is analyzed in the same manner as the noise from DTH pile installation and DTH drilling (or DTH) will be used to refer to both activities.

The likely or possible impacts of the proposed activity on marine mammals could involve both non-acoustic and acoustic stressors. As discussed above in Section 6.1.1, *Minor Stressors on ESA-listed Species*, potential non-acoustic stressors could result from the physical presence of the equipment and personnel; however, any impacts to marine mammals are expected to primarily be acoustic in nature.

6.1.2.2 Acoustic Thresholds

As discussed in Section 2, *Description of the Proposed Action*, ADOT&PF intends to conduct construction activities that would introduce underwater noise into the marine environment that may result in disturbance to listed species.

Since 1997, NMFS has used generic sound exposure thresholds to determine whether an activity produces underwater and in-air sounds that might result in impacts to marine mammals (70 FR 1871, 1872; January 11, 2005). NMFS developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary thresholds shifts (PTS and TTS) (83 FR 28824; June 21, 2018). NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels,[4]

[4] Sound pressure is the sound force per unit micropascals (μPa), where 1 pascal (Pa) is the pressure

expressed in root mean square[5] (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the Marine Mammal Protection Act (MMPA) (16 U.S.C § 1362(18)(A)(ii)):

- impulsive sound: 160 dB_{rms} re 1 µPa
- continuous sound: 120 dB_{rms} re 1µPa

Under the PTS Technical Guidance, NMFS uses the following thresholds (Table 7) for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA (16 U.S.C § 1362(18)(A)(i)) (NMFS 2018b). Different thresholds and auditory weighting functions are provided for different marine mammal hearing groups, which are defined in the Technical Guidance (NMFS 2018). The generalized hearing range for each hearing group is in Table 6.

Table 6. Underwater marine mammal hearing groups (NMFS 2018).

Hearing Group	ESA-listed Marine Mammals In the Project Area	Generalized Hearing Range[1]
Low-frequency (LF) cetaceans *(Baleen whales)*	Bowhead whales	7 Hz to 35 kHz
Mid-frequency (MF) cetaceans *(dolphins, toothed whales, beaked whales)*	None	150 Hz to 160 kHz
High-frequency (HF) cetaceans *(true porpoises)*	None	275 Hz to 160 kHz
Phocid pinnipeds (PW) *(true seals)*	Ringed and bearded seals	50 Hz to 86 kHz
Otariid pinnipeds (OW) *(sea lions and fur seals)*	None	60 Hz to 39 kHz

[1]Respresents the generalized hearing range for the entire group as a composite (i.e., all species within the group), where individual species' hearing ranges are typically not as broad. Generalized hearing range chosen based on ~65 db threshold from normalized composite audiogram, with the exception for lower limits for LF cetaceans (Southall et al. 2007a) and PW pinniped (approximation).

These acoustic thresholds are presented using dual metrics of cumulative sound exposure level

resulting from a force of one newton exerted over an area of one square meter. Sound pressure level is expressed as the ratio of a measured sound pressure and a reference level. The commonly used reference pressure level in acoustics is 1 µPa, and the units for underwater sound pressure levels are decibels (dB) re 1 µPa.

[5] Root mean square (rms) is the square root of the arithmetic average of the squared instantaneous pressure values.

(L_E) and peak sound level (PK) for impulsive sounds and L_E for non-impulsive sounds.

Level A harassment radii can be calculated using the optional user spreadsheet[6] associated with NMFS Acoustic Guidance, or through modeling.

Table 7. PTS Onset Acoustic Thresholds for Level A Harassment (NMFS 2018b).

Hearing Group	PTS Onset Acoustic Thresholds* (Received Level)	
	Impulsive	**Non-impulsive**
Low-Frequency (LF) Cetaceans	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency (MF) Cetaceans	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency (HF) Cetaceans	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,HF,24h}$: 173 dB
Phocid Pinnipeds (PW) (Underwater)	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW) (Underwater)	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

* Dual metric acoustic thresholds for impulsive sounds: Use whichever results in the largest isopleth for calculating PTS onset. If a non-impulsive sound has the potential of exceeding the peak sound pressure level thresholds associated with impulsive sounds, these thresholds should also be considered.

Note: Peak sound pressure (L_{pk}) has a reference value of 1 µPa, and cumulative sound exposure level (L_E) has a reference value of 1µPa²s. The subscript "flat" is being included to indicate peak sound pressure should be flat weighted or unweighted within the generalized hearing range. The subscript associated with cumulative sound exposure level thresholds indicates the designated marine mammal auditory weighting function (LF, MF, and HF cetaceans, and PW and OW pinnipeds) and that the recommended accumulation period is 24 hours. The cumulative sound exposure level thresholds could be exceeded in a multitude of ways (i.e., varying exposure levels and durations, duty cycle). When possible, it is valuable for action proponents to indicate the conditions under which these acoustic thresholds will be exceeded.

The MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]" (16 U.S.C. § 1362(18)(A)).

While the ESA does not define "harass," NMFS issued guidance interpreting the term "harass" under the ESA as to: "create the likelihood of injury to wildlife by annoying it to such an extent

[6] The Optional User Spreadsheet can be downloaded from the following website: http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm

as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). For purposes of this consultation, we consider any exposure to Level B behavioral disturbance sound thresholds to constitute harassment under the ESA and must be authorized by the Incidental Take Statement (see Section 10).

As described below, we expect that exposures to listed marine mammals from noise associated with the proposed action may result in disturbance (Level B harassment) and potential injury. With the addition of mitigation measures (including shutdown zones), no mortalities or permanent impairment to hearing are expected.

6.2 Expected Exposure Analysis

As discussed in the *Approach to the Assessment* section of this biological opinion, exposure analyses are designed to identify the listed species that are likely to co-occur with these effects in space and time and the nature of that co-occurrence. In this step of our analysis, we try to identify the number, age (or life stage), and gender of individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent. Response analyses determine how listed species are likely to respond after being exposed to an action's effects on the environment or directly on listed species themselves. Our assessments try to detect the probability of lethal responses, physical damage, physiological responses (particular stress responses), behavioral responses, and social responses that might result in reducing the fitness of listed individuals. Ideally, our response analyses consider and weigh evidence of adverse consequences, beneficial consequences, or the absence of such consequences.

NMFS expects that humpback whales will be exposed to underwater noise from pile driving activities (including vibratory pile driving and removal, impact pile driving, and DTH socketing and anchoring). Possible responses by Mexico DPS humpback whales to the sound produced by pile driving activities include:

- Physical Responses
  - Temporary or permanent hearing impairment (threshold shifts)
  - Non-auditory physiological effects
- Behavioral responses

As discussed in Section 2.1.2 above, the ADOT&PF proposed mitigation measures that should avoid or minimize exposure of humpback whales to acoustic stressors from the proposed action.

6.2.1 Ensonified area

This section describes the operational and environmental parameters of the activity that allow NMFS to estimate the area ensonified above the acoustic thresholds, and are based on only a single construction activity occurring at a time.

The sound field in the project area is the existing background noise plus additional construction noise from the proposed project. Marine mammals may be affected via sound generated by the primary components of the project (i.e., vibratory pile driving, vibratory pile removal, impact

pile driving, and DTH pile installation). NMFS used acoustic monitoring data from other locations to develop the source levels used to calculate distances to the Level A and Level B thresholds for different sizes of piles and installation/removal methods. The values used and the source from which they were derived are summarized in Table 8 and described in detail below.

Table 8. Estimates of mean underwater sound levels generated during vibratory pile removal, vibratory pile installation, impact pile installation, and DTH pile installation

Method and Pile Type	SSL at 10 meters			Literature Source	Federal Register Sources[a]
Continuous (Vibratory Pile Driving and DTH)	dB rms				
16-in Steel Piles	161			Navy 2012, 2015	A, B, C, H
24-in Steel Piles	161			Navy 2012, 2015	C, D, E, H, I
24-in DTH[b]	166			Denes *et al*. 2016 (Table 72) [b]	B, C, F, G
8-in DTH[c]	166			NMFS[c]	--
Impulsive (Impact Pile Driving and DTH)	dB rms	dB SEL	dB Peak		
24-in Steel Piles	193	181	210	Navy 2015	D, H, I
24-in DTH[b]	--	154	--	Denes *et al*. 2016[b]	--
8-in DTH[c]	--	144	170	Reyff 2020	--

[a] Federal Register (FR) sources:
A: 84 FR 24490, City of Juneau Waterfront Improvement Project, Juneau, Alaska
B: 85 FR 4278, Statter Harbor Improvement Project, Auke Bay, Alaska
C: 85 FR 673, Tongass Narrows Ferry Berth Improvements, Ketchikan, Alaska
D: 85 FR 19294, Port of Alaska's Petroleum and Cement Terminal, Anchorage, Alaska
E: 84 FR 56767, Auke Bay Ferry Terminal Modifications and Improvements Project, Juneau, Alaska
F: 85 FR 18196, Gastineau Channel Historical Society Sentinel Island Moorage Float Project, Juneau, Alaska
G: 85 FR 12523, Ward Cove Cruise Ship Dock Project, Juneau, Alaska
H: 83 FR 29749, City Dock and Ferry Terminal, Tenakee Springs, Alaska
I: 82 FR 48987, Sand Point City Dock Replacement Project, Sand Point, Alaska
[b] DTH pile installation is treated as a continuous sound for Level B calculations and impulsive for Level A calculations
[C] Tension anchor installation (8-in DTH) is currently treated as DTH pile installation
Notes: DTH = down-the-hole pile installation; SSL = sound source = level; dB = decibel; rms = root mean square; SEL = sound ure level

Vibratory hammers produce constant sound when operating, and produce vibrations that liquefy the sediment surrounding the pile, allowing it to penetrate to the required seating depth. An impact hammer would then generally be used to place the pile at its intended depth through rock or harder substrates. The actual durations of each installation method vary depending on the type and size of the pile. An impact hammer is a steel device that works like a piston, producing a series of independent strikes to drive the pile. Impact hammering typically generates the loudest noise associated with pile installation.

Vibratory removal of 16-inch piles is expected to be quieter than installation, so the sound source

level for installation is used as a conservative proxy.

DTH pile installation includes drilling (non-impulsive sound) and hammering (impulsive sound) to penetrate rocky substrates (Denes et al. 2016; Denes et al. 2019; Reyff and Heyvaert 2019). DTH pile installation was initially thought be a non-impulsive noise source. However, Denes et al. (2019) concluded from their study at Thimble Shoal, VA, that DTH should be characterized as impulsive based on a >3 dB difference in sound pressure level in a 0.035-second window (Southall et al. 2007b) compared to a 1-second window. Therefore, DTH pile installation is treated as both an impulsive and non-impulsive noise source. In order to evaluate Level A harassment, DTH pile installation activities are evaluated according to the impulsive criteria and the User Spreadsheet may be employed. Level B harassment isopleths are determined by applying non-impulsive criteria and using the 120 dB threshold which is also used for vibratory driving.

6.2.1.1 *Calculating distances to Level A thresholds*

NMFS developed a spreadsheet tool[7] to help implement the 2018 Technical Guidance (NMFS 2018a) that incorporates the duration of an activity into the estimation of a distance to the Level A isopleth. This estimation can then be used in conjunction with marine mammal density or occurrence to help predict takes. NMFS notes that because of some of the assumptions included in the methods used for these tools, the isopleths estimated may be overestimates, and the resulting estimate of Level A take may overestimate the number of animals that actually experience PTS if they should cross the Level A isopleth. However, these tools offer the best available way to conservatively predict appropriate isopleths until more sophisticated modeling methods are widely available. NMFS continues to develop ways to quantitatively refine these tools, and will qualitatively address the output where appropriate. For stationary sources such as impact driving, vibratory driving, and DTH pile installation, the NMFS User Spreadsheet predicts the distance at which a marine mammal would incur PTS if it remained at that distance the whole duration of the activity.

Inputs used in the User Spreadsheet are shown in Tables 9 and 10, and the resulting Level A isopleths are shown in Table 11. Level A harassment thresholds for impulsive sound sources (impact pile driving, DTH pile installation) are defined for both SELcum and Peak SPL, with the threshold that results in the largest modeled isopleth for each marine mammal hearing group used to establish the Level A harassment isopleth.

[7] NMFS User Spreadsheet Tool, version 2.2 (updated December 2020), available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance

Table 9. NMFS Technical Guidance (2020) User Spreadsheet Input to Calculate PTS Isopleths for Vibratory Pile Driving

USER SPREADSHEET INPUT –Vibratory Pile Driving Spreadsheet Tab A.1 Vibratory Pile Driving Used.			
	16-in piles (removal)	**24-in piles temporary (install/removal)**	**24-in plumb/batter piles permanent (install)**
Source Level (RMS SPL)	161	161	161
Weighting Factor Adjustment (kHz)	2.5	2.5	2.5
Number of piles within 24-hr period	4	4	4
Duration to drive a single pile (min)	30	30	30
Propagation (xLogR)	15	15	15
Distance of source level measurement (meters)+	10	10	10

Table 10. NMFS Technical Guidance (2020) User Spreadsheet Input to Calculate PTS Isopleths for Impact Pile Driving

USER SPREADSHEET INPUT – Impact Pile Driving Spreadsheet Tab E.1 Impact Pile Driving Used.							
	24-in piles (permanent)	**8-in pile (DTH)**	**8-in pile (DTH)**	**8-in pile (DTH)**	**24-in pile (DTH)**	**24-in pile (DTH)**	**24-in pile (DTH)**
Source Level (Single Strike/shot SEL)	181	144	144	144	154	154	154
Weighting Factor Adjustment (kHz)	2	2	2	2	2	2	2
Number of strikes per pile	20	54,000	108,000	162,000	54,000	81,000	162,000
Minutes per pile	-	60	120	180	60	90	180
Number of piles per day	3	1	1	1	1	1	1
Propagation (xLogR)	15	15	15	15	15	15	15

USER SPREADSHEET INPUT – Impact Pile Driving Spreadsheet Tab E.1 Impact Pile Driving Used.							
	24-in piles (permanent)	**8-in pile (DTH)**	**8-in pile (DTH)**	**8-in pile (DTH)**	**24-in pile (DTH)**	**24-in pile (DTH)**	**24-in pile (DTH)**
Distance of source level measurement (meters)+	10	10	10	10	10	10	10

Table 11. NMFS Technical Guidance (2020) User Spreadsheet Outputs to Calculate Level A Harassment PTS Isopleths

USER SPREADSHEET OUTPUT		**PTS isopleths (meters)**				
Activity	**Sound Source Level at 10 m**	**Level A harassment**				
		Low-Frequency Cetaceans	**Mid-Frequency Cetaceans**	**High-Frequency Cetaceans**	**Phocid**	**Otariid**
Vibratory Pile Driving/Removal						
16-in steel pile removal	161 SPL	10.8	1.0	16.0	6.6	0.5
24-in steel pile temporary installation and removal	161 SPL	10.8	1.0	16.0	6.6	0.5
24-in steel pile permanent	161 SPL	10.8	1.0	16.0	6.6	0.5
Impact Pile Driving						
24-in steel permanent installation (3 piles a day)	181 SEL/ 193 SPL	112.6	4.0	134.1	60.3	4.4
24-in steel permanent installation (2 piles a day)	181 SEL/ 193 SPL	85.9	3.1	102.3	46.0	3.3
24-in steel permanent installation (1 piles a day)	181 SEL/ 193 SPL	54.1	1.9	64.5	29.0	2.1
DTH						
8-in steel (60 min)	144 SEL/166 SPL	35.8	1.3	42.7	19.2	1.4

USER SPREADSHEET OUTPUT		PTS isopleths (meters)				
Activity	Sound Source Level at 10 m	Level A harassment				
		Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid	Otariid
8-in steel (120 min)	144 SEL/166 SPL	56.9	2.0	67.8	30.4	2.2
8-in steel (180 min)	144 SEL/166 SPL	74.5	2.7	88.8	39.9	2.9
24-in steel (60 min)	154 SEL/166 SPL	166.3	5.9	198.1	89.0	6.5
24-in steel (90 min)	154 SEL/166 SPL	218.0	7.8	259.6	116.6	8.5
24-in steel (180 min)	154 SEL/166 SPL	346.0	12.3	412.1	185.2	13.5

6.2.1.2 *Calculating distances to Level B thresholds*

Though significantly driven by received level, the onset of behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (e.g., frequency, predictability, duty cycle), the environment (e.g., bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Southall et al. 2007b; Ellison et al. 2012). Based on the available science and the practical need to use a threshold that is both predictable and measurable for most activities, NMFS uses a generalized acoustic threshold based on received level to estimate the onset of behavioral harassment. NMFS predicts that marine mammals are likely to be behaviorally harassed in a manner we consider Level B harassment when exposed to underwater anthropogenic noise above received levels of 120 dB_{rms} re 1 µPa for continuous or non-impulsive sources (e.g., vibratory pile-driving) and above 160 dB_{rms} re 1 µPa rms for non-explosive impulsive (e.g., impact pile-driving) or intermittent sources.

ADOT&PF's proposed construction activity for the Metlakatla Seaplane Facility improvements includes the use of continuous and impulsive sources, and therefore the 120 and 160 dB_{rms} re 1 µPa thresholds for Level B behavioral harassment are applicable.

Transmission loss (TL) is the decrease in acoustic intensity as an acoustic pressure wave propagates out from a source. TL parameters vary with frequency, temperature, sea conditions, current, source and receiver depth, water depth, water chemistry, and bottom composition and topography. The general formula for underwater TL is:

$$TL = B * \text{Log10}\ (R1/R2), \text{ where}$$

TL = transmission loss in dB

B = transmission loss coefficient; for practical spreading equals 15

R1 = the distance of the modeled SPL from the driven pile, and

R2 = the distance from the driven pile of the initial measurement

When site-specific transmission loss measurements are not available, the recommended TL coefficient for most nearshore environments is the default practical spreading value of 15. This value results in an expected propagation environment that would lie between spherical and cylindrical spreading loss conditions, which is the most appropriate assumption for ADOT&PF's proposed activity.

Utilizing the practical spreading loss model, ADOT&PF determined underwater noise will fall below the behavioral effects threshold of 120 dB rms for marine mammals at the distances shown in Table 9 for vibratory pile driving/removal, and DTH. With these radial distances, the largest Level B harassment zone calculated was for DTH at 11,659 m. For calculating the Level B harassment zone for impact driving, the practical spreading loss model was used with a behavioral threshold of 160 dB rms. The maximum radial distance of the Level B harassment zone for impact piling equaled 1,585 m for 24-in piles. Table 12 below provides all Level B harassment radial distances (m) during ADOT&PF's proposed activities.

Table 12. Radial Distances (meters) to Relevant Behavioral Isopleths

Activity	Received Level at 10 meters (m)	Level B Harassment Zone (m)*
Vibratory Pile Driving/Removal and DTH		
16-in steel piles	161 SPL	5,415 (calculated 5,412)
24-in steel piles	161 SPL	5,415 (calculated 5,412)
8-in and 24-in DTH	166 SPL	11,660
Impact Pile Driving		
24-in steel piles	181 SEL/193 SPL	1,585

* Numbers rounded up to nearest 5 meters. These specific rounded distances are for monitoring purposes rather than take estimation.

6.2.2 Estimating marine mammal occurrence

In this section we provide the information about the presence, density, or group dynamics of humpback whales that informed the take calculations.

Humpback whales occur frequently in the action area during summer and fall months to feed, but are less common during winter and spring. Recent marine mammal monitoring by the Alaska Department of Transportation & Public Facilities (ADOT&PF) for the Tongass Narrows Project (NMFS 2019) detected daily occurrences of a single humpback whale in Tongass Narrows during November 2020. However, anecdotal reports suggest that humpback whale abundance is

higher and occurrence is more regular in Metlakatla. Therefore, ADOT&PF requested authorization for and NMFS PR1 proposes to authorize harassment of two groups of two whales, up to four individuals per day, for 26 days of construction activity. Therefore:

4 whales per day * 26 days = 104 exposures of humpback whales to Level B harassment

Some whales may be present in the action area over multiple days and may be exposed to Level B harassment more than once. As described in Section 4.2.1, an estimated 6.1 percent of humpback whales in Southeast Alaska are from the Mexico DPS (Wade et al. 2016a)(Wade et al. 2016). Therefore, of the 104 potential instances of exposure to Level B harassment due to pile driving activities, we expect that 6.1%, or 7 of these 104 exposures would be ESA-listed Mexico DPS humpback whales, and the remaining 97 would most likely be from the non-listed Hawaii DPS.

ADOT&PF requested no authorization for serious injury or mortality or take by Level A harassment because these large whales can be effectively monitored and work can be halted before animals enter the Level A harassment zone when they are present. The size of the Level A harassment zones are expected to be manageable for the PSOs. The calculated Level A isopleths for low-frequency cetaceans are 113 m or less with the exception of DTH of limited duration of 24-in piles where they range from 166.3 - 346.0 m.

Table 13 Amount of proposed incidental harassment (takes) of Mexico DPS humpback whales from Metlakatla Seaplane Facility pile driving activities. Take estimates are rounded to the nearest whole number.

Species	Proposed Authorized Level A Takes	Proposed Authorized Level B Takes
Mexico DPS humpback whale	0	7

6.2.3 Exposure to underwater noise from pile driving activities

Mexico DPS humpback whales may be present within the waters of the action area during the time that the in-water work is being conducted and could be exposed to temporarily elevated underwater noise levels resulting in harassment.

Temporarily elevated underwater noise during pile driving activities has the potential to result in Level B (behavioral) harassment of marine mammals. Level A harassment (resulting in injury) is not expected to occur as a result of the proposed action because shutdown zones will be implemented and the mitigation measures proposed in Section 2.1.2 will reduce the potential for exposure to levels of underwater noise above the injury threshold established by NMFS.

For this analysis we estimated take by considering: 1) acoustic thresholds above which the best available science indicates marine mammals will be behaviorally harassed or incur TTS; 2) the area or volume of water that will be ensonified above these levels in a day; 3) the density or occurrence of marine mammals within these ensonified areas; and, 4) the number of days of

activities.

Exposure Assumptions

- An animal occurring within the Level A ensonified zone during pile driving activities would only be counted as Level A take, not both Level A and Level B take, even though the Level A zone is within the Level B zone.
- Exposures are based on total number of days that pile driving activities could occur and that animals might occur in the ensonified zone.
- All humpback whales occurring in the portion of the action area that is ensonified to levels that are expected to cause harassment during pile driving activities are assumed to be incidentally taken (i.e., exposures to sound levels at or above the relevant thresholds equate to take).
- An individual animal can only be taken once during a 24-hour period.
- For animals that may occur in groups, each individual in the group exposed to levels of sound capable of causing harassment would be considered taken.
- Level B exposure estimates are unmitigated and do not take into account mitigation efforts to reduce take as described in Section 2.1.2.
- The percentage of humpback whale exposures that are estimated to be from the threatened Mexico DPS (6.1 %) are based on percentages reported in Wade et al. (Wade et al. 2016b).

6.3 Response Analysis

As discussed in the *Approach to the Assessment* section of this opinion, response analyses determine how listed species are likely to respond after being exposed to an action's effects on the environment or directly on listed species themselves. Our assessments try to detect the probability of lethal responses, physical damage, physiological responses (particular stress responses), behavioral responses, and social responses that might result in reducing the fitness of listed individuals. Ideally, our response analyses consider and weigh evidence of adverse consequences, beneficial consequences, or the absence of such consequences.

Loud underwater noise can result in physical effects on the marine environment that can affect marine organisms. Possible responses by Mexico DPS humpback whales to the impulsive and continuous sound produced by pile installation and removal, rock socketing, and vessel noise include:

- Physical Response
  - Temporary or permanent hearing impairment (threshold shifts)
  - Non-auditory physiological effects
- Behavioral responses
  - Auditory interference (masking)

- Tolerance or habituation
- Change in dive, respiration, or feeding behavior
- Change in vocalizations
- Avoidance or displacement
- Vigilance

6.3.1 Responses to major noise sources (pile driving/removal activities)

As described in the *Exposure Analysis*, Mexico DPS humpback whales are expected to occur in the action area and are expected to overlap with noise associated with pile installation and removal activities. We assume that some individuals are likely to be exposed and respond to these impulsive and continuous noise sources.

With proper implementation of the mitigation measures and shutdown procedures described in Section 2.2, we do not expect that any Mexico DPS humpback whales will be exposed to noise levels loud enough, long enough, or at distances close enough for the proposed action to cause Level A harassment. We expect no more than 7 instances of exposure by Mexico DPS humpback whales to noise levels sufficient to cause Level B harassment, as described in Section 6.2.3. All Level B instances of take are expected to occur at received levels greater than 120 dB or 160 dB for continuous and impulsive noise sources, respectively.

The introduction of anthropogenic noise into the aquatic environment from pile driving activities is the primary means by which marine mammals may be harassed from the project activities covered in this opinion. In general, animals exposed to natural or anthropogenic sound may experience physical and psychological effects, ranging in magnitude from none to severe (Southall et al. 2007b). In general, exposure to pile driving and removal noise has the potential to result in auditory threshold shifts and behavioral reactions (e.g., avoidance, temporary cessation of foraging and vocalizing, changes in dive behavior). Exposure to anthropogenic noise can also lead to non-observable physiological responses such an increase in stress hormones. Additional noise in a marine mammal's habitat can mask acoustic cues used by marine mammals to carry out daily functions such as communication and predator and prey detection. The effects of pile driving and removal noise on marine mammals are dependent on several factors, including, but not limited to, sound type (e.g., impulsive vs. non-impulsive), the species, age and sex class (e.g., adult male vs. mom with calf), duration of exposure, the distance between the pile and the animal, received levels, behavior at time of exposure, and previous history with exposure (Wartzok et al. 2003; Southall et al. 2007b). Here we discuss physical auditory effects (threshold shifts) followed by behavioral effects.

6.3.1.1 *Threshold Shifts*

NMFS defines a noise-induced threshold shift (TS) as a change, usually an increase, in the threshold of audibility at a specified frequency or portion of an individual's hearing range above a previously established reference level (NMFS 2018a). In other words, a threshold shift is a hearing impairment and may be temporary (such as ringing in your ears after a loud rock concert), or permanent (such as the loss of the ability to hear certain frequencies or partial or complete deafness). The amount of threshold shift is customarily expressed in dB. As described

in NMFS (2018a), there are numerous factors to consider when examining the consequence of TS, including, but not limited to: 1) the signal temporal pattern (e.g., impulsive or non-impulsive), 2) likelihood an individual would be exposed for a long enough duration or to a high enough level to induce a TS, 3) the magnitude of the TS, 4) time to recovery (seconds to minutes or hours to days), 5) the frequency range of the exposure (i.e., spectral content), 6) the hearing and vocalization frequency range of the exposed species relative to the signal's frequency spectrum (i.e., how and animal uses sound within the frequency band of the signal; e.g., Kastelein et al. 2014), and 7) the overlap between the animal and the sound source (e.g., spatial, temporal, and spectral).

Temporary Threshold Shift (TTS)

TTS is the mildest form of hearing impairment that can occur during exposure to a strong sound (Kryter 1970). While experiencing TTS, the hearing threshold rises, and a sound must be stronger in order to be heard. In terrestrial mammals, TTS can last from minutes or hours to days (in cases of strong TTS). For sound exposures at or somewhat above the TTS threshold, hearing sensitivity in both terrestrial and marine mammals recovers rapidly after exposure to the sound ends. Few data exist on the sound levels and durations necessary to elicit mild TTS in marine mammals, and none of the published data describe TTS elicited by exposure to multiple pulses of sound. Available data on TTS in marine mammals are summarized in Southall et al. (2007).

For low-frequency cetaceans, no behavioral or auditory evoked potential threshold data exist. Therefore, hearing thresholds were estimated by synthesizing information from anatomical measurements, mathematical models of hearing, and animal vocalization frequencies (NMFS 2018a).

Although some Level B exposures may occur during the course of the proposed action, not all instances of Level B take will result in TTS because the estimated noise thresholds for the onset of TTS are conservative. If TTS does occur, it is expected to be mild and temporary and not likely to affect the long term fitness of the affected individuals.

Permanent Threshold Shift (PTS)

When PTS occurs, there is physical damage to the sound receptors in the ear. In severe cases, there can be total or partial deafness, while in other cases the animal has an impaired ability to hear sounds in specific frequency ranges (Kryter 1985). There is no specific evidence that exposure to pulses of sound can cause PTS in any marine mammal. However, given the possibility that mammals close to a sound source can incur TTS, it is possible that some individuals will incur PTS. Single or occasional occurrences of mild TTS are not indicative of permanent auditory damage, but repeated or (in some cases) single exposures to a level well above that causing the onset of TTS might elicit PTS.

Relationships between TTS and PTS thresholds have not been studied in marine mammals but are assumed to be similar to those in humans and other terrestrial mammals, based on anatomical similarities. PTS might occur at a received sound level at least several decibels above that which induces mild TTS if the animal were exposed to strong sound pulses with rapid rise time. For non-impulsive exposures (i.e., vibratory pile driving), a variety of terrestrial and marine mammal

data sources indicate that threshold shift up to 40 to 50 dB may be induced without PTS, and that 40 dB is a conservative upper limit for threshold shift to prevent PTS. An exposure causing 40 dB of TTS is therefore considered equivalent to PTS onset (NMFS 2018a).

For the proposed project activities, the calculated distances to the Level A isopleths range from approximately 10m to 350 m. The shutdown zones to be implemented are larger than the calculated isopleths to ensure that no humpback whales are exposed to noise levels that could cause PTS or other Level A disturbance. No exposures are expected at levels resulting in PTS due to conservative estimates of Level A isopleths and mitigation measures to shut down pile driving activities if a humpback whale approaches a Level A zone.

6.3.1.2 *Non-Auditory Physiological Effects*

Non-auditory physiological effects or injuries that theoretically might occur in marine mammals exposed to strong underwater sound include stress, neurological effects, internal bubble formation, resonance effects, and other types of organ or tissue damage (Cox et al. 2006; Southall et al. 2007b). Studies examining such effects are limited. In general, little is known about the potential for pile driving activities to cause auditory impairment or other physical effects in marine mammals. Available data suggest that such effects, if they occur at all, would presumably be limited to short distances from the sound source and to activities that extend over a prolonged period. The available data do not allow identification of a specific exposure level above which non-auditory effects can be expected (Southall et al. 2007a) or any meaningful quantitative predictions of the numbers (if any) of marine mammals that might be affected in those ways. Marine mammals that show behavioral avoidance of pile driving, including some odontocetes and some pinnipeds, are especially unlikely to incur auditory impairment or non-auditory physical effects.

An animal's perception of a threat may be sufficient to trigger stress responses consisting of some combination of behavioral responses, autonomic nervous system responses, neuroendocrine responses, or immune responses (Moberg 2000). In many cases, an animal's first and sometimes most economical (in terms of energetic costs) response is behavioral avoidance of the potential stressor. Autonomic nervous system responses to stress typically involve changes in heart rate, blood pressure, and gastrointestinal activity. These responses have a relatively short duration and may or may not have a significant long-term effect on an animal's fitness.

The primary distinction between stress (which is adaptive and does not normally place an animal at risk) and "distress" is the cost of the response. During a stress response, an animal uses glycogen stores that can be quickly replenished once the stress is alleviated. In such circumstances, the cost of the stress response would not pose serious fitness consequences. However, when an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other functions. This state of distress will last until the animal replenishes its energetic reserves sufficient to restore normal function.

Relationships between these physiological mechanisms, animal behavior, and the costs of stress responses are well-studied through controlled experiments and for both laboratory and free-ranging animals (Jessop et al. 2003; Lankford et al. 2005; Crespi et al. 2013). Stress responses

due to exposure to anthropogenic sounds or other stressors and their effects on marine mammals have also been reviewed (Fair and Becker 2000; Romano et al. 2002) and, more rarely, studied in wild populations (Romano et al. 2002). For example, Rolland et al. (2012) found that noise reduction from reduced ship traffic in the Bay of Fundy was associated with decreased stress in North Atlantic right whales. During the time following September 11, 2001, shipping traffic and associated ocean noise decreased along the northeastern U.S. This decrease in ocean noise was associated with a significant decline in fecal stress hormones in North Atlantic right whales, suggesting that chronic exposure to increased noise levels, although not acutely injurious, can produce stress (Rolland et al. 2012). These stress hormones returned to their previous level within 24 hours after the resumption of shipping traffic. Exposure to loud noise can also adversely affect reproductive and metabolic physiology (Kight and Swaddle 2011). In a variety of factors, including behavioral and physiological responses, females appear to be more sensitive or respond more strongly than males (Kight and Swaddle 2011).

These and other studies lead to a reasonable expectation that some marine mammals will experience physiological stress responses upon exposure to acoustic stressors and that it is possible that some of these would be classified as "distress." In addition, any animal experiencing TTS would likely also experience stress responses (NRC 2003)

We expect a small number of individual humpback whales may experience TTS and may experience non-auditory physiological effects from project activities. Therefore, we expect ESA-listed humpback whales may experience mild stress responses in reaction to project activities within the Level B zone. However, we expect most humpback whales would leave the ensonified areas to avoid excessive noise and avoid stress. If humpbacks are not displaced and remain in a stressful environment (i.e., within the harassment zone of pile driving activities), we expect the stress response will dissipate shortly after the cessation of pile driving activities. However, in any of the above scenarios, we do not expect significant or long-term harm to individuals from a stress response because of this action.

6.3.1.3 *Behavioral Disturbance Reactions*

Behavioral responses are influenced by an animal's assessment of whether a potential stressor poses a threat or risk. Behavioral responses may include: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where sound sources are located; and/or flight responses.

Disturbance includes a variety of effects, including subtle changes in behavior, more conspicuous changes in activities, and displacement. Behavioral responses to sound are highly variable and context-specific, and reactions, if any, depend on species, state of maturity, experience, current activity, reproductive state, auditory sensitivity, time of day, and many other factors (Southall et al. 2007).

Habituation can occur when an animal's response to a stimulus wanes with repeated exposure, usually in the absence of unpleasant associated events (Wartzok et al. 2003). Animals are most likely to habituate to sounds that are predictable and unvarying. The opposite process is

sensitization, when an unpleasant experience leads to subsequent responses, often in the form of avoidance, at a lower level of exposure. Behavioral state may affect the type of response as well. For example, animals that are resting may show greater behavioral change in response to disturbing sound levels than animals that are highly motivated to remain in an area for feeding (Richardson et al. 1995; NRC 2003; Wartzok et al. 2003).

Controlled experiments with captive marine mammals showed pronounced behavioral reactions, including avoidance of loud sound sources (Ridgway et al. 1997; Finneran et al. 2003). Observed responses of wild marine mammals to loud pulsed sound sources (typically seismic guns or acoustic harassment devices, but also including pile driving) have been varied but often consist of avoidance behavior or other behavioral changes suggesting discomfort (Morton and Symonds 2002; Wartzok et al. 2003; Thorson and Reyff 2006; Nowacek et al. 2007). Responses to continuous sound, such as vibratory pile installation, have not been documented as fully as responses to pulsed sounds.

The biological significance of many of these behavioral disturbances is difficult to predict, especially if the detected disturbances appear minor. However, the consequences of behavioral modification could be biologically significant if the change affects growth, survival, or reproduction. Significant behavioral modifications that could potentially lead to effects on growth, survival, or reproduction include:

- Drastic changes in diving/surfacing patterns (such as those thought to cause beaked whale stranding due to exposure to military mid-frequency tactical sonar);
- Longer-term habitat abandonment due to loss of desirable acoustic environment; and
- Longer-term cessation of feeding or social interaction.

The onset of behavioral disturbance from anthropogenic sound depends on both external factors (characteristics of sound sources and their paths) and the specific characteristics of the receiving animals (hearing, motivation, experience, demography), and is difficult to predict (Southall et al. 2007).

6.3.1.4 *Auditory Masking*

Natural and artificial sounds can disrupt behavior by masking, or interfering with, a marine mammal's ability to hear other sounds. Masking occurs when the receipt of a sound is interfered with by another coincident sound at similar frequencies and at similar or higher levels. Chronic exposure to excessive, though not high-intensity, sound could cause masking at particular frequencies for marine mammals that utilize sound for vital biological functions. Masking can interfere with detection of acoustic signals such as communication calls, echolocation sounds, and environmental sounds important to marine mammals. Therefore, under certain circumstances, marine mammals whose acoustical sensors or environment are being severely masked could also be impaired from maximizing their performance or fitness in survival and reproduction. If the coincident (masking) sound were anthropogenic, it could be potentially harassing if it disrupted hearing-related behavior. It is important to distinguish TTS and PTS, which persist after the sound exposure, from masking, which occurs only during the sound exposure. Because masking (without resulting in threshold shift) is not associated with abnormal

physiological function, it is not considered a physiological effect, but rather a potential behavioral effect.

Masking occurs at the frequency band the animals utilize, so the frequency range of the potentially masking sound is important in determining any potential behavioral impacts. Lower frequency man-made sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey sound. Anthropogenic sounds may also affect communication signals when both occur in the same sound band and thus reduce the communication space of animals (Clark et al. 2009) and cause increased stress levels (Foote et al. 2004; Holt et al. 2009).

Masking has the potential to affect species at the population or community levels as well as at individual levels. Masking affects both senders and receivers of the signals and can potentially have long-term chronic effects on marine mammal species and populations. Recent research suggests that low frequency ambient sound levels have increased by as much as 20 dB (more than a three-fold increase in terms of SPL) in the world's ocean from pre-industrial periods, and that most of these increases are from distant shipping (Hildebrand 2009). All anthropogenic sound sources, such as those from vessel traffic, pile driving, and dredging activities, contribute to the elevated ambient sound levels, thus intensifying masking.

Pile driving activities are relatively short-term in duration. It is possible that pile driving noise or vessel noise resulting from this proposed action may mask acoustic signals important to Mexico DPS humpback whales, but the limited affected area and infrequent occurrence of humpback whales in the action area would result in insignificant impacts from masking. Any masking event that could possibly rise to Level B harassment under the MMPA would occur concurrently within the zones of behavioral harassment already estimated for vibratory pile driving, and which have already been taken into account in the *Exposure Analysis*.

6.3.2 Response analysis summary

Humpback whales' probable responses to pile installation and removal include TTS, increased stress, and/or short-term behavioral disturbance reactions such as changes in activity and vocalizations, masking, avoidance or displacement, or habituation. These reactions and behavioral changes are expected to be temporary and subside quickly when the exposures cease. The primary mechanism by which these behavioral changes may affect the fitness of individual animals is through the animals' energy budget, time budget, or both (the two are related because foraging requires time). Large whales such as humpbacks have the ability to store substantial amounts of energy, which allows them to survive for months on stored energy during migration and while in their wintering areas, and their feeding patterns allow them to acquire energy at high rates. Nichols Passage has not been identified as an important migration route or as important foraging habitat for humpback whales, and the proposed activities are not expected to hinder migration during the action or displace foraging animals. Because humpbacks are not expected to be feeding in the action area, there is little incentive for them to remain in the action area while the disturbance is occurring and we expect most animals would leave the area during pile driving activities if they were disturbed. The individual and cumulative energy costs of the behavioral responses we have discussed are not likely to reduce the energy budgets of humpback whales, and their probable exposure to noise sources are not likely to reduce their fitness.

7. Cumulative Effects

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area (50 CFR § 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate change within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline versus cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the *Environmental Baseline* (Section 5).

All of the activities described in the *Environmental Baseline* are expected to continue into the future. The improvements to the existing Metlakatla Seaplane Facility are intended to allow residents of the village of Metlakatla to more safely and securely embark and disembark from float planes. The action is unlikely to increase the number of float planes using the facility.

8. Integration and Synthesis

This section is the final step of NMFS's assessment of the risk posed to listed species as a result of implementing the proposed action. In this section, we add the *Effects of the Action* (Section 6) to the *Environmental Baseline* (Section 5) and the *Cumulative Effects* (Section 7) to formulate the agency's biological opinion as to whether the proposed action is likely to result in appreciable reductions in the likelihood of the survival or recovery of the species in the wild by reducing its numbers, reproduction, or distribution. These assessments are made in full consideration of the *Status of the Species* (Section 4).

As discussed in the *Approach to the Assessment* (Section 3) section of this biological opinion, we begin our risk analysis by asking whether the probable physical, physiological, behavioral, or social responses of endangered or threatened species are likely to reduce the fitness of endangered or threatened individuals or the growth, annual survival or reproductive success, or lifetime reproductive success of those individuals.

As part of our risk analyses, we identified and addressed all potential stressors and considered all consequences of exposing listed species to all the stressors associated with the proposed action, individually and cumulatively, given that the individuals in the action area for this consultation are also exposed to other stressors in the action area and elsewhere in their geographic range.

Based on the results of the exposure and response analyses, we expect a maximum of 104 instances of Level B harassment of humpback whales by noise from pile driving activities (impact, vibratory, and DTH), and 6.1 percent (7 individuals) of those instances of harassment of humpback whales are anticipated to affect animals from the Mexico DPS. Exposure to vessel noise from transit and potential for vessel strike may occur, but adverse effects from vessel disturbance and noise are likely to be negligible due to the small marginal increase in such activities relative to the environmental baseline and the transitory nature of vessels. Adverse

effects from vessel strike are considered extremely unlikely because of the few additional vessels introduced by the action and the unlikelihood of these type of interactions. Disturbance to seafloor, habitat, and prey resources are not expected to adversely affect humpback whales because these disturbances are temporary, and the action area is not important habitat to humpback whales for foraging, migrating, breeding, or other essential life functions. Mitigation measures and adherence to Clean Water Act regulations are expected to minimize the risk of exposure of humpback whales to the potential introduction of pollutants into the action area.

As discussed in the *Proposed Action* and *Status of the Species* sections, this action does not overlap in space or time with humpback whale breeding. Some Mexico DPS humpback whales feed in Southeast Alaska in the summer and fall months and migrate to Mexican waters for breeding and calving in the late winter months. As a result, the probable responses to pile driving and removal noise are not likely to reduce the current or expected future reproductive success of Mexico DPS humpback whales or reduce the rates at which they grow, mature, or become reproductively active.

Therefore, these exposures are not likely to reduce the abundance, reproduction rates, or growth rates (or increase variance in one or more of these rates) of the populations those individuals represent. The short duration of the action and the implementation of mitigation measures to reduce exposure to high levels of sound reduce the likelihood that exposure would cause a behavioral response that may affect vital functions, or cause TTS or PTS. Additionally, when considered in conjunction with the effects of the proposed action, cumulative effects of future state or private activities in the action area are likely to affect humpback whales at a level comparable to present. The current and recent population trends for humpback whales in Southeast Alaska indicate that these levels of activity are not hindering population growth.

We do not expect the effects of the proposed project activities combined with the existing activities described in the *Environmental Baseline* (Section 5) and the cumulative effects (Section 7) to hinder population growth or reduce the numbers, reproduction, or distribution of Mexico DPS humpback whales. As a result, this project is not likely to appreciably reduce Mexico DPS humpback whales' likelihood of surviving or recovering in the wild.

9. Conclusion

After reviewing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, and cumulative effects, it is NMFS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Mexico DPS of humpback whale.

10. Incidental Take Statement

Section 9 of the ESA prohibits the take of endangered species unless there is a special exemption. NMFS extended all the prohibitions of section 9 to threatened Mexico DPS humpback whales through a rule issued pursuant to ESA section 4(d) (81 FR 62260, 62314; September 8, 2016). "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. § 1532(19)). "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out

of an otherwise lawful activity (50 CFR § 402.02). Based on NMFS guidance, the term "harass" under the ESA means to: "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (Wieting 2016). The MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment] (16 U.S.C. § 1362(18)(A)(i) and (ii)). For this consultation, NMFS anticipates that any take will be by harassment only. No serious injury, mortality, or Level A takes are contemplated or authorized.

Under the terms of Section 7(b)(4) and Section 7(o)(2) of the ESA, taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement (ITS).

Section 7(b)(4)(C) of the ESA provides that if an endangered or threatened marine mammal is involved, the taking must first be authorized by Section 101(a)(5) of the MMPA. Accordingly, **the terms of this incidental take statement and the exemption from Section 9 of the ESA become effective only upon the issuance of MMPA authorization to take the marine mammals identified.** Absent such authorization, this incidental take statement is inoperative.

The terms and conditions described below are nondiscretionary. The FAA and NMFS PR1 have a continuing duty to regulate the activities covered by this ITS. In order to monitor the impact of incidental take, the FAA and PR1 must monitor and report on the progress of the action and its impact on the species as specified in the ITS (50 CFR § 402.14(i)(3)). If the FAA or PR1 (1) fails to require the permit holder to adhere to the terms and conditions of the ITS through enforceable terms that are added to the authorization, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

10.1 Amount or Extent of Take

Section 7 regulations require NMFS to estimate the number of individuals that may be taken by proposed actions or utilize a surrogate (e.g., other species, habitat, or ecological conditions) if we cannot assign numerical limits for animals that could be incidentally taken during the course of an action (50 CFR § 402.14(i)(1); see also 80 FR 26832; May 11, 2015).

The taking of Mexico DPS humpback whales will be by incidental harassment only. The taking by serious injury or death is prohibited and will result in the modification, suspension, or revocation of the ITS. Table 15 lists the amount and timing of authorized take (incidental take by harassment) for this action. The method for estimating the number of exposures to sound levels expected to result in Level B harassment is described in Section 6.2. NMFS anticipates that 104 instances of Level B harassment of humpback whales may occur. Of these 104 instances, 6.1% (or 7) are predicted to be from the Mexico DPS. Therefore, NMFS is authorizing 7 Level B harassment takes under the ESA. NMFS will not consider that ADOT&PF has reached its take

limit under this ITS until 104 humpback whales have been observed in the Level B zone during in-water construction activities.

Pile driving activities will be halted as soon as possible when it appears a humpback whale is approaching the Level A shutdown zone and before it reaches the Level A isopleth. No Level A take of marine mammals is authorized in this biological opinion.

Table 14. Summary of anticipated instances of exposure to sound from pile driving activities resulting in the incidental take of Mexico DPS humpback whales by Level B harassment. These take numbers reflect only the individuals that are expected to be from the ESA-listed DPS that may be present in the action area.

Species	Total Amount of Take Associated with Proposed Action		Anticipated Temporal Extent of Take
	Level A	Level B	
Mexico DPS humpback whale	0	7	October 1, 2021 through March 13, 2022

10.2 Effect of the Take

The only takes authorized during the proposed action are Level B takes by acoustic harassment from pile driving activities. No serious injury or mortality or Level A harassment is anticipated or authorized as part of this proposed action. This consultation has assumed that exposure to pile driving activities might disrupt one or more behavioral patterns that are essential to an individual animal's life history. However, any behavioral responses of these whales and any associated disruptions are not expected to affect their fitness, reproduction, survival, or recovery.

In Section 9 of this biological opinion, NMFS determined that the level of incidental take, coupled with other effects of the proposed action, is not likely to jeopardize the continued existence of Mexico DPS humpback whales.

10.3 Reasonable and Prudent Measures

Reasonable and prudent measures (RPMs) are those actions "necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take" (50 CFR § 402.02). RPMs are nondiscretionary, and the failure to comply with RPMs (and the terms and conditions that implement them) may invalidate the take exemption and result in unauthorized take.

RPMs are distinct from the mitigation measures that are included in the proposed action (described in Section 2.1.2). We presume that the mitigation measures will be implemented as described in this opinion. The failure to do so will constitute a change to the action that may require reinitiation of consultation pursuant to 50 C.F.R. § 402.16.

The RPMs included below, along with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action.

NMFS concludes that the following RPMs are necessary and appropriate to minimize or to monitor the incidental take of Mexico DPS humpback whales resulting from the proposed action.

1. The FAA and PR1 will ensure the implementation of a monitoring and reporting program that allows NMFS AKR to evaluate the exposure estimates contained in this biological opinion and that underlie this ITS.
2. The FAA and PR1 will ensure the implementation of any additional mitigation measures applicable to humpback whales that are required by the IHA to be issued by NMFS Permits Division.

10.4 Terms and Conditions

"Terms and conditions" implement the reasonable and prudent measures (50 CFR § 402.14). These must be carried out for the exemption in section 7(o)(2) of the ESA to apply.

In order to be exempt from the prohibitions of section 9 of the ESA, the FAA and PR1 must comply (or must ensure that any applicant complies) with the following terms and conditions, which implement the RPMs described above. These terms and conditions are in addition to the mitigation measures included in the proposed action, as set forth in Section 2.1.2 of this opinion. The FAA and PR1 or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this incidental take statement (50 CFR §402.14).

Any taking that is in compliance with these terms and conditions is not prohibited under the ESA (50 CFR § 402.14(i)(5)). As such, partial compliance with these terms and conditions may invalidate this take exemption and result in unauthorized, prohibited take under the ESA. If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the action may lapse.

These terms and conditions constitute no more than a minor change to the proposed action because they are consistent with the basic design of the proposed action.

To carry out RPMs #1 and 2 the FAA and PR1 must undertake (or require their grantees/permitees to undertake) the following:

1. Submit a draft marine mammal monitoring and mitigation plan to NMFS AKR for review and concurrence prior to commencing in-water construction activities.
2. Immediately report to NMFS AKR the taking of any ESA-listed marine mammal in a manner other than that described in this ITS.

11. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR § 402.02).

For this proposed action, NMFS suggests the following conservation recommendation:

1. Project vessel crews should participate in the WhaleAlert program to report real-time sightings of whales while transiting in the waters of Southeast Alaska and to minimize the risk of vessel strikes. More information is available at https://www.fisheries.noaa.gov/resource/tool-app/whale-alert.

In order to keep NMFS's Protected Resources Division informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the FAA and PR1 should notify NMFS of any conservation recommendations they implement in their final action.

12. Reinitiation of Consultation

As provided in 50 CFR § 402.16, reinitiation of consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action on listed species or designated critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in this opinion, or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount of incidental take is exceeded, section 7 consultation must be reinitiated immediately (50 CFR § 402.14(i)(4)).

13. Data Quality Act Documentation and Pre-Dissemination Review

Section 515 of the Treasury and General Government Appropriations Act of 2001 (Public Law 106-554) (Data Quality Act (DQA)) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

13.1 Utility

This document records the results of an interagency consultation. The information presented in this document is useful to NMFS, the FAA, and the general public. These consultations help to fulfill multiple legal obligations of the named agencies. The information is also useful and of interest to the general public as it describes the manner in which public trust resources are being managed and conserved. The information presented in these documents and used in the underlying consultations represents the best available scientific and commercial information and has been improved through interaction with the consulting agency.

This consultation will be posted on the NMFS Alaska Region website http://alaskafisheries.noaa.gov/pr/biological-opinions/. The format and name adhere to conventional standards for style.

13.2 Integrity

This consultation was completed on a computer system managed by NMFS in accordance with

relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

13.3 Objectivity

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the ESA Consultation Handbook, ESA Regulations, 50 CFR 402.01 et seq.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the literature cited section. The analyses in this opinion contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA implementation, and reviewed in accordance with Alaska Region ESA quality control and assurance processes.

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